Incoming M/023/004

cc: Leslie Davis

Task ID# 2543

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July 14, 2008

Beth Ericksen
Engineer
Utah Division of Oil Gas & Mining
1594 West North Temple Street
Salt Lake City, Utah 84114

Dear Ms. Ericksen,

Enclosed is one copy of the second draft of the Notice of Intention to Revise Large Mining Operations for the Ash Grove Cement Company's Hank Allen Pit (Leamington Plant) M/023/004. This submittal includes a replacement copy of the text of the NOI, and replacement copies of the tables and plates requiring edits as noted in your comments for the first draft (submitted March 5, 2007). In addition, addenda have been provided for Appendix 13 of the NOI. Edits have been made in redline/strikeout format. The revisions made in response to the comments on the first draft have been highlighted. Plates, figures, tables, and appendices submitted as revisions for the first draft that did not require additional changes are not being submitted with this draft.

Please let me know if there is anything else that you need, or have any questions. I can be reached at (801) 561-1555, or at amenitove@earthfax.com.

Regards,

Ari Menitove
Geological Engineer
EarthFax Engineering, Inc.

Encl:
NOI text, tables, plates, addenda to Appendix 13

cc: Josh Nelson

0001

Application for Mineral Mine Plan Revision or Amendment

Operator: Ash Grove Cement Company

Mine Name: File Number: M/023/004

Provide a detailed listing of all changes to the mining and reclamation plan that will be required as a result of this change. Individually list all maps and drawings that are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise or amend the existing Mining and Reclamation Plan. **Include page, section and drawing numbers as part of the description.**

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
x ADD	☐ REPLACE	☐ REMOVE	Table of Contents. Added entry for new section 110.6.
x ADD	☐ REPLACE	☐ REMOVE	p. vi – vii. Updated list of changes.
x ADD	☐ REPLACE	☐ REMOVE	p. vii. Added language indicating that the pit design complies with the highwall stability evaluation recommendations.
x ADD	☐ REPLACE	☐ REMOVE	p. 105-3, §105.3.14. Added text to say that limestone highwalls we be sloped at a maximum angle of 2V:1H. Revised list of pit floor areas not to be revegetated.
x ADD	x REPLACE	☐ REMOVE	p. 106-1, 106-2, §106.2. Added a statement addressing the issue of deleterious materials. Also updated the description of the Mine Plan Summary.
x ADD	x REPLACE	☐ REMOVE	p. 106-3, §106.3. Updated life-of-mine estimate. Clarified description of disturbance acreages.
x ADD	x REPLACE	☐ REMOVE	p. 106-20, §106.4. Updated life-of-mine estimate . Added annual limestone and wasterock production amounts. Also added annual topsoil recovery amounts.
☐ ADD	x REPLACE	☐ REMOVE	p.106-21. Table 4-106.4-1. Replaced table with updated values.
x ADD	☐ REPLACE	☐ REMOVE	p. 106-24, §106.6. Clarified statement about topsoil handling.
☐ ADD	x REPLACE	☐ REMOVE	p. 106-27, §106.8. Updated water elevation in water well.
x ADD	☐ REPLACE	☐ REMOVE	p. 106-27 §106.9. Added text to describe the dimensions and volume of the waste stockpile. Also provided drainage control information.
x ADD	x REPLACE	☐ REMOVE	p. 107-1,2, §107.1.12. Updated waste disposal service providers. Added text to describe handling and disposal of deleterious materials.
x ADD	☐ REPLACE	☐ REMOVE	p. 107-2, §107.1.14. Added text to describe the placement of highwall warning signs.
x ADD	☐ REPLACE	☐ REMOVE	p. 107-3, §107.2. Added text to describe Pond #7.
x ADD	☐ REPLACE	☐ REMOVE	p. 107-3, §107.4. Added text to describe handling, storage, and disposal of hazardous materials.
x ADD	☐ REPLACE	☐ REMOVE	p. 109-3, §109.3. Revised statement addressing topsoil storage.
x ADD	☐ REPLACE	☐ REMOVE	p. 109-3, §109.4. Revised description of highwall design. Provided Utah DAQ Title V Operating Permit number.
x ADD	☐ REPLACE	☐ REMOVE	p. 110-1, 110-2, §110.2. Updated the description of the manner and extent of reclamation. Added text to reiterate maximum highwall slope angles. Added text to explain runoff and erosion control at the waste rock storage pile. Also added volume of waste rock and storage information for the Southwest Pit as requested.
☐ ADD	☐ REPLACE	x REMOVE	p. 110-3, §110.2. Removed Table 4-110-2-1
☐ ADD	☐ REPLACE	x REMOVE	p. 110-4, §110.2. Removed Table 4-110-2-2
x ADD	☐ REPLACE	☐ REMOVE	p. 110-5, §110.5.11. Added text that stated pit floors would not be revegetated, which is consistent with what was originally stated in §105.3.14.
x ADD	☐ REPLACE	☐ REMOVE	p. 110-11, §110.6. Added this section as requested.

2ND Draft Revision Table

x ADD	• REPLACE	• REMOVE	p. 111-1, §111.1.12. Added language to assure that wastes would be disposed of using environmentally protective ways.
x ADD	• REPLACE	• REMOVE	p. 111-1, §111.1.14. Added language to describe signage during reclamation.
x ADD	• REPLACE	• REMOVE	p. 111-2, §111.1.15. Added elaborative text as requested.
x ADD	• REPLACE	• REMOVE	p. 111-4, §111.4. Added language to indicate that any deleterious materials encountered during reclamation will be disposed of as specified in §107.1.12.
☐ ADD	x REPLACE	• REMOVE	p. 111-4, §111.6. No response to specific comments required. DOGM comments appear to refer to rock slope stability whereas this section addresses soil slope stability. The stability of the only soil slope at the mine (the waste rock pile) is adequately discussed in this section. Note that slope angle of the topsoil stockpile has been changed.
☐ ADD	x REPLACE	• REMOVE	p. 112-1 to 112-3, §112.1. Updated variance requests.
x ADD	x REPLACE	• REMOVE	p. 113-1, 113-2, §113.3. Added text to explain that the surety estimate is based on both RSMeans costs and site-specific estimates. Also revised description of surety estimate.
x ADD	• REPLACE	• REMOVE	§113.3. Added Table 113-3-1 (Surety Summary). Added Mob/Demob Costs for Reclamation Equipment Table to calculate mob/demob costs.
x ADD	• REPLACE	• REMOVE	Appendix 2. Drawing R647-4-105.1Ba. Added June 2006 quarry disturbance boundary.
☐ ADD	x REPLACE	• REMOVE	Appendix 5. Drawing R647-4-105.2Q. Added notation describing that the Chaffin Quarries are Pre-SMCRA.
☐ ADD	x REPLACE	• REMOVE	Appendix 8. Drawing R647-4-105.3.17. Updated acreages in legend and for waste rock stockpile. Also added locations of reclamation channels.
☐ ADD	x REPLACE	• REMOVE	Appendix 8A. Drawing R647-4-108. Added locations of borings described in the 2001 Seegmiller report.
☐ ADD	x REPLACE	• REMOVE	Appendix 9. Drawing R647-4-109. Updated acreage of waste rock stockpile.
x ADD	x REPLACE	• REMOVE	Appendix 13. Updated hydrology calculations for the reclamation drainage channels. Added hydrology calculations for Pond 7.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.

Bruce W Newell

July 8, 2008 Date

Bruce Newell
Plant Manager
Leamington Plant, Ash Grove Cement Company

FOR DOGM USE ONLY:
File #: M/ /
Approved:
Bond Adjustment: from ($)
to $

Return to: State of Utah Department of Natural Resources Division of Oil, Gas and Mining 1594 West North Temple, Suite 1210 Box 145801 Salt Lake City, Utah 84114-5801 Phone: (801) 538-5291 Fax: (801) 359-3940

NOTICE OF INTENTION

TO REVISE LARGE MINING OPERATIONS

LEAMINGTON PLANT AND QUARRY

PERMIT NO. M/023/004

Revised Text/Tables

Submitted To:

UTAH DEPARTMENT OF NATURAL RESOURCES

DIVISION OF OIL, GAS, AND MINING

SALT LAKE CITY, UTAH

By:

ASH GROVE CEMENT COMPANY
LEAMINGTON PLANT
P. O. BOX 51
NEPHI, UTAH 84648

Submittal Date: June 27, 2000
Revised and Re-submitted February 28, 2001
Revised and Re-submitted August 31, 2001
Revised and Re-submitted March 5, 2007
Revised and Re-submitted July 14, 2008

NOTICE OF INTENTION TO REVISE MINING OPERATIONS

ASH GROVE CEMENT COMPANY
LEAMINGTON PLANT and QUARRY
JUAB AND MILLARD COUNTIES, UTAH
PERMIT NO. M/023/004

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NOTICE OF INTENTION TO REVISE MINING OPERATIONS
(~~May 24March 5~~July 14, 200~~78~~0)

ASH GROVE CEMENT COMPANY
LEAMINGTON PLANT and QUARRY
JUAB AND MILLARD COUNTIES, UTAH
PERMIT NO. M/023/004

SUMMARY

Ash Grove Cement Company (the Operator) is pleased to submit this document, entitled "Notice of Intention to Revise Large Mining Operations (Permit No. M/023/004)" (the NOI), for the Leamington Plant to the State of Utah, Department of Natural Resources, Division of Oil, Gas and Mining (the Division), for its review and comment. Ash Grove respectfully requests that the Division grant approval for the revisions to the mining operation described in this submittal.

This NOI is submitted in accordance with the Utah Department of Natural Resources, Division of Oil, Gas and Mining, Minerals Reclamation Program, Rules R647-1 through R647-5, which was last revised in ~~1994~~ 2006 (the Rules). More specifically, this submittal is made in compliance with the requirements of Section R647-4 Large Mining Operations. This submittal is organized and presented in a format which repeats each section of the Rules followed by Ash Groves' response. The submittal includes narrative text in response to the Rules and figures, tables, drawings and maps as required by the Rules and/or to provide additional information to support the responses.

Ash Grove owns lands, located in Juab and Millard Counties, near the town of Leamington, Utah, on which it operates a surface limestone quarry for the production of limestone and shale. The limestone and shale are used as raw products in the manufacture of Portland cement at the Leamington Plant. This NOI provides information, as required by the Division's Rules, to address proposed changes in the mining plans, mining operations and reclamation by Ash Grove at the Leamington Plant and Quarry.

This NOI describes the proposed revisions to the life-of-quarry mining plan, provides a summary of reclamation operations and includes a revised calculation of the estimated reclamation cost. Additionally, the NOI includes various figures, tables, maps and drawings to further explain the revisions to the mining operations.

INTRODUCTION

Ash Grove Cement Company (the Operator) owns and operates the Leamington Plant (the Plant), located in Juab County, and the adjacent Quarry (the Quarry), located in Juab and Millard Counties, Utah. The Plant and Quarry are located adjacent to Highway 132, five miles northeast of the town of Leamington and approximately 23.5 miles southwest of Nephi, Utah, as shown on the Site Vicinity Map(Figure 1)in this section of the NOI.

The Plant is located in Leamington Canyon, south of and adjacent to the Sevier River. The Plant is located in parts of Sections 32 and 33, Township 14 South and Range 3 West. The Quarry is located south of the Plant in the Canyon Mountains. The present active Quarry operations are located in part of Section 33, Township 14 South and Range 3 West and part of Section 4, Township 15 South and Range 3 West. The combined facilities are located entirely on lands owned in fee by Ash Grove, located in all or part of Sections 32, 33 and 34, Township 14 South and Range 3 West, and Sections 3, 4 and 5, Township 15 South and Range 3 West.

The Plant and Quarry are located on the Champlin Peak, Utah U.S. Geological Survey 7.5' Series topographic map sheet dated 1967, as shown on the Quarry Location Map (Figure 2). The natural ground elevation of the site varies from 4,825 feet above mean sea level in the vicinity of the railroad/truck load-out silos adjacent to the UP Railroad to 6,314 feet near the top bench of the Quarry.

The Quarry is operated by Ash Grove Cement Company and presently produces approximately ~~975,000~~900,000 tons of limestone and ~~14,000~~129,000 tons of shale annually. The limestone and shale are used by Ash Grove as part of the components of the kiln feed used by the Plant in the manufacture of Portland cement. The cement is transported from the Plant to the consumer by truck and rail.

The Quarry and Plant were originally developed by Martin Marietta Cement Western Division (the original Permittee). Martin Marietta referred to the Quarry as the Hank Allen Quarry in honor of the geologist who identified and explored the limestone deposit. A Notice of Intention to Commence Mining Operations, dated December 1979 (herein referred to as the "original NOI"), was submitted by Martin Marietta and received by the Division on December 15, 1979. The original NOI included a total of 273 acres to be disturbed over an estimated forty years of mining operations. This total disturbance area included: 177 acres for the Quarry, 7 acres for a quartzite quarry (silica source),44 acres for a waste dust area, and 45 acres for the Plant, which was referred to as the "manufacturing area".

FIGURE 1 - SITE VICINITY MAP

FIGURE 2 - QUARRY LOCATION MAP

The original reclamation bond was posted on February 14, 1980, as a surety in the amount of $386,000. The Division completed its review on February 25, 1980, and prepared an Executive Summary for the Board of Oil, Gas and Mining. After receiving public comment and being provided with acceptable reclamation surety, the Division issued Permit No. M/023/004.

Plant construction and Quarry development began on June 9, ~~1981~~1980. Commercial operations and the production of cement began in ~~1983~~ November 1981 by Martin Marietta. Southwestern Portland Cement operated the Plant under a lease agreement with Martin Marietta between 1984 and 1989. Ash Grove purchased the Leamington Plant and Quarry from Martin Marietta on May 8, 1989. Ash Grove has operated the Plant and Quarry since that time.

After its acquisition of the Plant and Quarry, Ash Grove began a program to plan for growth. Various mining plans were developed and modifications and improvements were made to the Plant and Quarry. Mine planning completed in 1994 resulted in a proposed expansion of the Quarry, use of out-of-pit waste shale placement areas, relocation of the crusher and the decision to replace the truck haulage system with a portable crusher and conveyor haulage system.

Based on this mine plan, Ash Grove submitted a Notice of Intention to Revise Large Mining Operation, dated February 28, 1995 (herein referred to as the "1995 NOI"), to the Division. The Division began its review of the 1995 NOI. During this period Ash Grove continued to examine its mining and haulage plans. This review process showed that the economics of the proposed portable crusher and conveyor system were not acceptable to Ash Grove. It was decided to continue with the truck-loader mining method, but utilize larger, more efficient 100-ton haul trucks.

The Division provided its initial comments on the 1995 NOI to Ash Grove by letter dated June 8, 1995. Ash Grove reviewed the Division's comments and responded by letter, dated January 16, 1996. The Division responded to Ash Grove by letter, dated April 4, 1996, and identified a number of "technical concerns" which needed to be addressed before the Division could proceed to issue tentative approval.

During the review/response process of the 1995 NOI between the Division and Ash Grove, Ash Grove submitted, by letter dated July 8, 1996, a request for variance under Rule 647-4-111.7 Reclamation Practices. This request was for a variance for the final highwall slope for the current operations. The Division granted the variance by letter dated July 23, 1996. This variance allowed Ash Grove "...to construct highwalls which are approximately 63^0 in the 'current quarry area' as shown on the maps included with the April

4, 1996, letter." Ash Grove continued formulating its response to the Division's April 4, 1996, comments to the 1995 NOI.

After further reviewing the mining reserves and long-range mining plans, Ash Grove requested in November 1998, that the 1995 NOI submittal (which was never formally approved) be withdrawn. Ash Grove would submit a new NOI that would more accurately describe its current and proposed mining operations and long-range mining plans. A revised Base Map was submitted to the Division in November 1998, to serve as an interim measure while completion of the new NOI was in progress. The following sections of this report combine to form the new submittal for the NOI as required by the Division. After responding to additional comments the NOI initially submitted in 1998 was approved in 2001.

This NOI provides new information describing ~~the~~ additional proposed changes in the mining operation, proposed reclamation of disturbed lands, and a new calculation of the estimated costs of reclaiming the Plant and Quarry. Additionally, this submittal includes a revised Reclamation Surety Estimate form based on the calculation of the estimated costs to reclaim the final Plant and Quarry.

Ash Grove requests the Division's approval of this NOI and the revisions to the existing Permit No. M/023/004 which include, but are not limited to, the following changes:

1. Revision of the current and proposed disturbance limit and a design for pit expansion in the central block, northeast block, and a new southwest block.

2. Revision of the reclamation surety estimate.

3. Variance request from Rule R647-4-111.7 to allow construction of limestone highwalls with slopes of 2H:1V (63.4°). The slopes will consist of 60-foot tall bench faces and 30-foot wide benches. The south face of the central pit will have 3 50-foot wide step-out benches, as recommended in a slope stability study performed at the pit.

4. The slope stability study mentioned in item 3 has been submitted for inclusion in this NOI.

5. Variance request from Rule 647-4-111.8 to allow for two segments of access roads to remain partially unreclaimed after reclamation in order to allow landowner access for the Operator as well as adjacent landowners.

6. Submission of design hydrology calculations for Sedimentation Pond #7 and the reclamation drainage channels.

~~1. Revision of the current Permit Boundary to include all lands owned by Ash Grove that are presently proposed for use as industrial/mining in connection with the Leamington Plant and Quarry and for future expansion into the Northeast and Southwest blocks.~~

~~2. Revision of the current Disturbance Limit Boundary to include additional lands needed for the proposed expansion of the Quarry operation into the Northeast and Southwest blocks.~~

~~3. Revision of the current reclamation surety to include all lands that have been disturbed to date and are proposed to be disturbed over the life of the Quarry operation.~~

~~4. Variance request from Rule R647-4-111.7 to allow construction of highwall slopes of 2 vertical to 1 horizontal (approximately 63 degrees) in limestone in any mining area within the Proposed Permit Boundary.~~

~~5. The quartzite quarry included in the original permit is no longer active. There is not a small portable crusher located at the quartzite quarry.~~ ~~vi~~

~~65. Three stratigraphic units, identified as the "L3" limestone, the "S3" shale and the "L4" limestone will be mined in the Central and Southwest Pits. Seven stratigraphic units, identified as the "L1" through "L4" limestones and the "s1" through "s3", shales will be mined in the Northeast pit.instead of the seven units identified in the original permit.~~

~~10. Construction of settling ponds for waste disposal areas.~~

~~11. The proposed method and conduct of reclamation operations, including waste rock disposal areas.~~

~~127. Quarry benches are designed to be 60 feet vertical and 30 feet horizontal, instead of 60 feet vertical and 40 feet horizontal.~~

INSTRUCTIONS to REVISE or AMEND MINING OPERATIONS NOTICE OF INTENTION

When an operator intends to revise or amend a mining operation, a **notice** to Amend or Revise the mining and reclamation plan **must be submitted** to the Division **and approved prior to creating any disturbance beyond what has already been approved.** The notice must include all information, concerning the revision or amendment, that would have been required if it had been included in the original Notice of Intention (NOI).

"REVISION" means a **significant change** to the approved Notice of Intention to Conduct Mining Operations, which will increase the amount of land affected or alter the location and type of onsite surface facilities such that the nature of the reclamation plan will differ substantially from the approved Notice of Intention. Revisions require a formal public notice of tentative approval and may require a change in the amount of reclamation surety.

"AMENDMENT" is an **insignificant change** to the approved Notice of Intention. An amendment requires Division approval, but does not require public notice.

The Division will determine whether a request for change is significant or insignificant on an individual case-by-case basis.

Instructions:

- Changes to the mining and reclamation plan are made by providing a completely new plan or by adding, replacing, or removing pages to the current plan. Detailed instructions for adding or replacing pages and maps must be included (please identify on the attached form MR-REV-att).
- Text changes should be shown in a redline/strikeout format.
- The amended application should be accompanied by a cover letter: referring to the permit number, operator name and mine; describing the contents; and referencing any Division action that initiated the change (i.e. Notice of Violation, previous review, Division Order).
- The submitted revision or amendment must be complete and should not rely on additional materials that will be submitted at a later date.
- Form MR-REV-att, or equivalent, must be submitted with the application for change.

After the Division conditionally approves the change, two clean copies will be requested which will be stamped "approved" and one copy returned for your copy of the mining and reclamation plan. The change is now approved and you may proceed with your plans.

Identify any changes this modification will have to:

I. General Information (R647-4-104)

- Location of Proposed Activities:
- COUNTY: Juab and Millard Counties
- LEGAL DESCRIPTION: T. 14S, R. 3W, S. 32 NE¼, S. 33 NW¼, SW¼, and SE¼ and S. 34 SWSWSW and T. 15S, R. 3W, S. 3 NW¼ and NWNE, S. 4 N½, N½SE, and N½SW, and S. 5 NESE, SENE

Ownership of Land Surface:

- Private (Fee): Ash Grove Cement Company
- State of Utah (SITLA) lands: NO
- Public Domain BLM): NO
- National Forest (USFS): NO

Ownership of Minerals:

- Private (Fee): Ash Grove Cement Company
- State of Utah (SITLA) lands: NO
- Public Domain BLM): NO
- National Forest (USFS): NO
- BLM Lease or Project File Number(s): Not Applicable
- USFS assigned Project Number(s): Not Applicable
- Utah State Lease Numbers(s) : Not Applicable

II. MAPS, DRAWINGS & PHOTOGRAPHS (Rule R647-4-105)

Appropriate maps, drawings, plates, etc. should be provided that are pertinent to the revision, or amendment of mining operations. Please provide a revised map outlining the previously approved and the new proposed disturbed area boundaries. These materials should be prepared according to the requirements of Rule R647-4-105.

A list of the maps, drawings, figures, and aerial photographs is provided in the Table of Contents of this NOI. A list of the following Maps and Figures have been updated:

R647-4-104.3L, R647-4-105.1Ba, R647-4-105.3-17, R647-4-105.4, R647-4-105.2Q, R647-4-106-1, R647-4-106.5, R647-4-106.9-1A, 1B, and 1C, R647-4-107.2, R647-4-108, R647-4-109, and R647-4-113.

III. OPERATION PLAN (Rule R647-4-106)

All appropriate information requirements outlined under Rule R647-4-106 must be addressed in the application. Identify additional proposed surface disturbance. Include the total number of acres to be affected by the revision or amendment.

The mining operation will be conducted as described in the this Notice of Intention to Commence Mining Operations and and approved by the Division. A description of the proposed operation plan with an explanation of the proposed revisions to the mining plan is provided in Section R647-4-106 Operation Plan of this NOI.

IV. IMPACT ASSESSMENT (Rule R647-4-109)

Provide information required under Rule R647-4-109 regarding projected potential surface and/or subsurface impacts that may be associated with the proposed change(s) in mining operations.

The types of impacts associated with the revised mining plan and proposed changes in mining operations are presented in this NOI. These proposed changes include: an expansion of mining operations further into an additional reserve block located northeast of the original central mining block; the expansion of the central pit to the southwest; the possible addition of an out-of-pit waste rock storage area; and disturbance of additional acres which are needed for the proposed expansion of the mining operations. A description of these impacts is provided in Section R647-4-109 Impact Assessment of this NOI.

V. RECLAMATION PLAN (Rule R647-4-110)

Outline any proposed changes to the originally approved reclamation plan. Address all appropriate sections of Rule R647-4-110 as they apply to the proposed change(s) in mining operations.

Reclamation operations will be conducted as described in Section R647-4-110 Reclamation Plan of this NOI.

VI. VARIANCE (Rule R647-4-112)

Identify any requests for variance from the requirements of rules R647-4-107, -108, or -111. A narrative justification and alternate methods or mitigating measures must be included for each variance request.

No new request for variance from the requirements of Rules R647-4-107 or -108 is made in this submittal as previously permitted. A variance to rule R647-4-111.8 Roads and Pads is requested to allow two roads to remain after reclamation. The roads to remain after reclamation will be dirt roads with a nominal width of 12 feet. They will be used for reclamation monitoring and access by landowners. However, the variances previously approved by the Division for a final highwall slope of 2 vertical to 1 horizontal (approximately 66°) on limestone slopes and 1 horizontal to 1 vertical horizontal (approximately 45°) in shale is requested to be approved for the expanded mine areas. A description of the requested variances is provided in Section R647-4-112 of this NOI.

VII. SURETY (Rule 647-4-113)

Reclamation Surety: Indicate whether the proposed activities will change the amount of work required to reclaim the mine site. If significant changes will result, then an itemized reclamation cost estimate should be provided (and attached) with direct reference to the specifics of the proposed change(s). This information will be used to assist the Division in determining any reclamation surety adjustments required for the operation.

The proposed changes in the conduct of mining operations in the Central reserve block, the addition of the southwest pit, and the expansion of the mining operation into the Northeast reserve block, as described in this NOI, will increase the amount of land disturbed. This proposed expansion will result in a change to the amount of work required to reclaim the mine site. Information to adjust the bond calculation is provided in this Application.

Application for Mineral Mine Plan Revision or Amendment

Operator: Ash Grove Cement Company

Mine Name: File Number: M/023/004

Provide a detailed listing of all changes to the mining and reclamation plan that will be required as a result of this change. Individually list all maps and drawings that are to be added, replaced, or removed from the plan. Include changes of the table of contents, section of the plan, pages, or other information as needed to specifically locate, identify and revise or amend the existing Mining and Reclamation Plan. **Include page, section and drawing numbers as part of the description.**

DETAILED SCHEDULE OF CHANGES TO THE MINING AND RECLAMATION PLAN

			DESCRIPTION OF MAP, TEXT, OR MATERIALS TO BE CHANGED
☐ ADD	x REPLACE	☐ REMOVE	p.i, Summary: Changed submission date, referred to updated DOGM Rules.
☐ ADD	x REPLACE	☐ REMOVE	p.ii., Introduction: Increased annual limestone production to 1.2 Mt/yr.
☐ ADD	x REPLACE	☐ REMOVE	p. v. Revised construction and production dates.
☐ ADD	x REPLACE	☐ REMOVE	p. vi-vii, Introduction: Updated chronology and the list of changes in the NOI.
☐ ADD	x REPLACE	☐ REMOVE	p.105-1, §105.1: Updated Base Map aerial photography date. Noted that some of the Chaffin Quarries have been mined through.
☐ ADD	x REPLACE	☐ REMOVE	p.105-2, §105.3.11: Updated reference to revised map.
x ADD	☐ REPLACE	☐ REMOVE	p.105-3, §105.3.14: Added text to explain that some pre-law quarries have been and would be mined through during expansion.
☐ ADD	x REPLACE	☐ REMOVE	p.105-4, §105.3.15: Changed text to accurately describe map.
☐ ADD	x REPLACE	☐ REMOVE	p.105-4, 105-5 §105.3.16: fixed typo, added reference to more recent slope stability report.
☐ ADD	x REPLACE	☐ REMOVE	p.105-6,7 §105.3.17: Updated description of revised Map R647-4-113 (Appx. 10).
☐ ADD	x REPLACE	☐ REMOVE	p.105-7, §105.3.18: Removed references to the sequence of mining operations maps, as advised by DOGM. Replaced text with a reference to the ultimate mining map. Also revised total mine production amount.
☐ ADD	x REPLACE	☐ REMOVE	p.105-8, §105.4: Change text to refer to an updated aerial photo.
x ADD	x REPLACE	x REMOVE	p.106-3, §106.2: Updated map references, updated text to mention rock waste dump that is currently being used. Deleted redundant text.
☐ ADD	x REPLACE	☐ REMOVE	p. 106-4 to p. 106-19, §106.3: Drawings 4-106-1 through 4-106-12, Mine Progress Maps: Removed as directed by DOGM and replaced with Drawing 4-106-1: Ultimate Mine Map.
x ADD	x REPLACE	☐ REMOVE	p. 106-4 to p. 106-19, §106.3: Replaced drawings 4-106-9-1 (Cross Section A-A') and 4-106-9-3 (Cross Section B-B') with Figures 4-106.9-1A, 1B, and 1C, Geologic Cross Sections of the Central, Northeast and Southwest Blocks, respectively.
☐ ADD	☐ REPLACE	x REMOVE	Figures 106.9-2 and 106.9-4: These figures are not required. The information in these figures is presented in The Ultimate Pit Map and its associated cross sections.
☐ ADD	x REPLACE	☐ REMOVE	p.106-20, §106.3: Revised quarry disturbance acreage.
☐ ADD	x REPLACE	☐ REMOVE	p.106-3, 106-20, §106.3: Revised life of quarry disturbance acreage.
☐ ADD	x REPLACE	☐ REMOVE	p.106-22, §106.5: Updated Figure 4-106-5 (Soil Survey Map) with new proposed Life of Quarry Disturbance Limit.
☐ ADD	x REPLACE	☐ REMOVE	p.106-27, §106.9: Updated text to discuss rock waste dump located west of the crusher.
☐ ADD	x REPLACE	☐ REMOVE	p.107-3, §107.2: Updated text to discuss constructed sediment pond that controls runoff from the waste rock dump.
x ADD	☐ REPLACE	☐ REMOVE	p.109-1, §109.2: Added language to incorporate SW expansion into biological resource assessment.
x ADD	☐ REPLACE	☐ REMOVE	p.109-3, §109.4: Added reference to more recent slope stability report.
☐ ADD	x REPLACE	☐ REMOVE	p.111-3, Table 4-111-2-1: Updated reclamation channel peak flow for RC-1, based on revised ultimate pit.
☐ ADD	x REPLACE	☐ REMOVE	p.112-1, 112-2, §112: Updated reference to drawings, updated variance request.
x ADD	☐ REPLACE	☐ REMOVE	p.112-2, 112-3, §112.1.13: Added findings from more recent slope stability report.

• ADD	x REPLACE	• REMOVE	p.113-1,2 §113.1: Revised disturbed area acreage and corresponding surety amount.
□ ADD	x REPLACE	• REMOVE	Appendix No. 1: Drawing No. R647-4-104.3L, Updated Land Ownership Map.
□ ADD	x REPLACE	• REMOVE	Appendix No. 2: Drawing No. R647-4-105.1Ba, Updated Base Map.
□ ADD	x REPLACE	• REMOVE	Appendix No. 3: Drawing No. R647-4-105.4, Updated aerial photo.
□ ADD	x REPLACE	• REMOVE	Appendix No. 5: Drawing No. R647-4-105.2Q, Updated Surface Facilities-Quarry Map.
• ADD	x REPLACE	• REMOVE	Appendix No. 7: Drawing No. R647-4-107.2, Updated Drainage Control Map.
□ ADD	x REPLACE	• REMOVE	Appendix No. 8: Drawing No. R647-4-105.3.17, Updated Proposed Reclamation/ Revegetation Area Map
• ADD	x REPLACE	• REMOVE	Appendix No. 9: Drawing No. R647-4-109, Updated Life of Quarry Disturbance Map.
• ADD	x REPLACE	• REMOVE	Appendix No. 10: Drawing No. R647-4-113, Updated Comparison of Original Bonded Area to Present Disturbance Limit Map.
x ADD	• REPLACE	• REMOVE	Appendix No. 16: Attached an additional rock slope stability report.

I hereby certify that I am a responsible official of the applicant and that the information contained in this application is true and correct to the best of my information and belief in all respects with the laws of Utah in reference to commitments and obligations, herein.

Bruce W Newell

Bruce Newell
Plant Manager
Leamington Plant, Ash Grove Cement Company

July 9, 2008
Date

FOR DOGM USE ONLY:
File #: M/ /
Approved:
Bond Adjustment: from ($)
to $

Return to: State of Utah Department of Natural Resources Division of Oil, Gas and Mining 1594 West North Temple, Suite 1210 Box 145801 Salt Lake City, Utah 84114-5801 Phone: (801) 538-5291 Fax: (801) 359-3940

ASH GROVE CEMENT COMPANY
LEAMINGTON PLANT AND QUARRY, UTAH

SUBMITTAL BY ASH GROVE CEMENT COMPANY TO THE UTAH DEPARTMENT OF NATURAL RESOURCES, DIVISION OF OIL, GAS AND MINING, OF NOTICE OF INTENTION TO REVISE MINING OPERATIONS, ASH GROVE CEMENT COMPANY, LEAMINGTON PLANT, M/023/004, JUAB AND MILLARD COUNTIES, UTAH.

The following states or refers to the section of the Division's Rules and is followed by Ash Grove's response to the requirements of the Rule:

R647-4-104. Operator(s), Surface and Mineral Owner(s).

104.1. The name, permanent mailing address, and telephone number of the operator responsible for the mining operations and reclamation of the site.

Response:

Ash Grove Cement Company
Leamington Plant
P. O. Box 51
Nephi, Utah 84648

Leamington Plant, Leamington, Utah
435-857-1212 Administrative Office
435-857-1288 Fax

104.2. The name, permanent mailing address, and telephone number of the surface landowner(s) and mineral owner(s) of all land to be affected by the operations.

Response:

Ash Grove Cement Company
Leamington Plant
P. O. Box 51
Nephi, Utah 84648

Leamington Plant, Leamington, Utah
435-857-1212 Administrative Office
435-857-1288 Fax

104.3. The federal mining claim number(s), lease number(s), or permit number(s) of any mining claims, or federal or state leases or permits included in the lands affected.

Response:

All proposed mining operations are conducted on land owned in fee by Ash Grove. There are no federal mining claims, lease numbers, or permit numbers of any mining claims, federal or state leases or permits, except for the Division's mining permit M/023/004, included in the lands to be affected within the Proposed Permit Boundary. The Proposed Permit Boundary is coincident with, and the same as, the boundary lines of property owned in fee by Ash Grove. A Land Ownership Map is included in Appendix No. 1 of this NOI to show property boundaries, mining claims, etc. on adjacent lands.

R647-4-105. Maps, Drawings & Photographs

105.1 Topographic base map, boundaries, pre-act disturbance.

Response:

A Topographic Base Map has been prepared at a scale of 1 inch to 400 feet. This Base Map was prepared from aerial photography flown in ~~April 1998~~June 2006. The Base Map includes topography (20 foot contour interval) developed from aerial photography and shows the following as required by Sections 105.1.11 through 105.1.14 of the Rules:

Property boundaries of surface ownership of all lands which are to be affected by the mining operations. Ash Grove owns in fee all lands included within the Proposed Permit Boundary. These lands are shown on the Land Ownership map in Appendix No. 1 of this NOI;

Perennial streams, springs, and other bodies of water, roads buildings, landing strips, electrical transmission lines, water wells, oil and gas pipelines, existing wells, boreholes, or other existing surface or subsurface facilities within 500 feet of the proposed mining operations;

The Proposed route of access to the mining operations from Highway 132, the nearest publicly maintained highway, is shown on the Base Map in Appendix No. 2 of this NOI. This map is at a scale appropriate to show access; and

Known areas which have been previously impacted by mining or exploration activities within the proposed disturbed area are shown on the Surface Facilities - Quarry Map, located in Appendix No. 4 of this NOI. This map shows the location of ~~eight~~ six small abandoned and inactive limestone quarries located within the Life-Of-Quarry Disturbance Limit (note that Quarries D and E have been mined through). These are known as the Chaffin Quarries and are identified as Quarry A through H. They were mined in the early 1900's and were in existence on the site prior to the original Permittee and the present Operator beginning mining and manufacturing activities. The Surface Facilities-Quarry Map also shows the location of a quartzite quarry that was previously mined by the Operator as a source of silica and other areas that the Operator has disturbed for mining operations.

These and other items required under Section R647-4-105.1 are shown on more detailed maps included in this NOI. Wells, post mine drainage, ponds, existing surface or sub-surface facilities, etc. have been included on separate drawings for clarity. A separate map has been prepared at a scale of 1 inch to 1,000 feet to show Land Ownership and is included in Appendix No. 1 of this NOI. The Topographic Base Map is included in Appendix No. 2 of this NOI.

105.2 Surface facilities map

Response:

A Surface Facilities - Plant Map has been prepared at a scale of 1 inch to 100 feet to identify and show the location of facilities, such as buildings, roads and other structures located within the cement manufacturing area of the Plant. This map also shows the location of utility easements, such as overhead electric transmission lines and natural gas pipelines and the Proposed Permit Boundary in the vicinity of the Plant. The Surface Facilities - Plant Map is included in Appendix No. 4 of this NOI.

A Surface Facilities - Quarry Map has been prepared at a scale of 1 inch to 400 feet to show the location of the current facilities, such as buildings and other structures, roads, crusher, etc. This map also identifies the Proposed Permit Boundary and the Present Limit of Disturbance, as of May 7, 1999, within the active limestone quarry area. The Surface Facilities - Quarry Map is included in Appendix No. 4 of this NOI.

105.3 Maps, Drawings or Cross Sections

105.3.11 Regraded slopes to be left at steeper than 2h:1v.

Response:

No slopes that are proposed to be re-graded will be left at steeper than 2h:1v. However, it is proposed, as previously approved by the Division for the Central reserve block in the quarry, that final, un-graded highwalls in the Northeast reserve block also will be left at steeper than 2h:1v. A variance will be requested from the Division for these final highwall areas in the Northeast reserve block, as shown in Drawings 4-106-1~~1 and 4-106-12~~. Slopes from the out-of-pit waste rock disposal area, identified on Drawings 4-106-1 through 4-106-10, that are greater than 2h:1v will be re-graded.

105.3.12 Plans, profiles and cross sections of roads, pads or other earthen structures to be left as part of the post mining land use.

Response:

All features, such as roads (except those to be left for property access) pads, ponds, or other earthen structures, currently used by Ash Grove will be reclaimed.

105.3.13 Water impounding structures.

Response:

All sediment control ponds and their associated surface diversion structures that have been constructed or that may be constructed in the future will be removed as part of the reclamation plan as described in section R647-4-110.

105.3.14 Maps identifying surface areas that will be disturbed but will not be reclaimed.

Response:

All surface areas that are disturbed will be reclaimed, except for the following:

A. Standing final limestone highwalls (2v:1h maximum)and final shale highwalls (1h:1v maximum) in the Central, Southwest, and Northeast reserve blocks;
B. Portions of the ~~F~~final quarry pit floors in the Central, Southwest, and Northeast blocks;
C. A road leading north (the North road) from Highway 132 to the railroad; and
D. A road leading south (the South road) from Highway 132 to the Quarry.

Standing highwalls will be left to provide potential habitat and cover for raptors and other wildlife species that may utilize these areas for shelter and nesting sites. The north and south roads will remain to provide access to the property and across the property by others who own property to the north and south.

Chaffin Quarries A, B, C, F, and H represent disturbances prior to 1975 and prior to our activities at the site. These Quarries have been left undisturbed except for Quarries B & C. These Quarries were used as temporary storage areas for kiln waste dust, which was a byproduct of our manufacturing process at the time the plant started. Dust was stored in this area because of the protection the limestone rock walls and floor provided. In 1989 our cement manufacturing process was changed and waste dust was no longer a byproduct. Since 1997 we have started recovering these storage piles by reclaiming the material back into our manufacturing process. By the year 2007 these waste piles will no longer exist and reclamation for Quarries B & C will be considered completed. It is not feasible to rip and seed the bottom of Quarries B and C because the bottom of the pits are solid rock and would provide no growth medium for the vegetation. Quarries D and E have been mined out, and Quarries B and C will eventually be mined out due to expansion of the Northeast Pit.

The areas that will be reclaimed and re-vegetated are shown on the map entitled "Reclamation Activities & Treatment, Proposed Area To Be Reclaimed and Re-vegetated" included in Appendix No. 6 of this NOI.

105.3.15 Sediment ponds, diversion channels, culverts.

Response:

A Drainage Control Map has been prepared at a scale of 1 inch to 400 feet on a topographic map base. This map shows the Proposed Permit Boundary, Life-of-Quarry Disturbance Limit, Proposed Pit Limits ~~for the Central and Northeast reserve blocks and the Future Quarry Expansion Limit for the Southwest reserve block~~, existing and proposed ponds, and direction of drainage from the final pits. This Drainage Control Map is included in Appendix No. 7 of this NOI.

105.3.16 Baseline information maps and drawings

Response:

The following baseline information maps and drawings are also included in the ~~Appendix~~ Appendices of this NOI to provide additional information to the Division and to assist in making a determination of existing pre-mining conditions, operations, reclamation and post-mining land use:

1. A map entitled "Geology of the Champlin Peak Quadrangle, Juab and Millard Counties, Utah", prepared by Janice M. Higgins, is included in Appendix No. 8. This map is included to provide information on the geology of the Quarry and a description of the limestone and shale units to be mined.

2. A report entitled "Soil Conservation Service Soil and Vegetation Survey", prepared by the U.S. Department of Agriculture, Natural Resources Conservation Service, is included in Appendix No. 11. This report is included to provide additional site-specific information on soils in the vicinity of the Quarry as a supplement to the soil information presented in the Fairfield-Nephi Soil Survey and vegetation based on observations made in the vicinity of the Plant and Quarry.

3. A report entitled "Biological Assessment for Threatened, Endangered, and Proposed Species for the Proposed Ash Grove Cement Plant Expansion", prepared by the U.S. Department of Agriculture, Forest Service, Fishlake National Forest, Fillmore Ranger District, is included in Appendix No. 12. This report is included to provide information on the biological assessment

completed to analyze and evaluate the potential effects of the Quarry on the threatened, endangered and proposed species that may occur in the vicinity of the Plant and Quarry.

4. A report entitled "Biological Evaluation for Sensitive Plant and Animal Species for the Proposed Ash Grove Cement Plant Expansion", prepared by the U.S. Department of Agriculture, Forest Service, Fishlake National Forest, Fillmore Ranger District, is also included in Appendix No. 12. This report is included to provide information on the biological evaluation completed to analyze and evaluate the potential effects of the Quarry on the sensitive plant and animal species that may occur in the vicinity of the Plant and Quarry.

5. A report entitled "Surface Drainage Martin Marietta Cement Plant, Leamington, Utah", prepared by Rollins, Brown and Gunnell, Inc., is included in Appendix No. 13. This report is included to provide background information on soils and hydrology of the small surface drainage area in the vicinity of the Plant into which drainage from the Quarry flows.

6. A report entitled "1993-94 Annual Report of Findings and Water Withdrawals", prepared by Kubal-Furr & Associates, is included in Appendix No. 14. This report is included to provide information on the monitor wells installed on the Plant and Quarry. The information in this report includes identification numbers, locations, dates of installation and water-level measurements.

7. ~~A~~ Two reports entitled "Initial Evaluation Highwall Slope Stability Hank Allen Quarry, Ash Grove Cement Company, Juab and Millard Counties, Utah", and "Highwall Stability Evaluation: Ultimate Pit Slope Angles, Hank Allen Quarry - Leamington Plant, Central and Northeast Block Pits, Juab and Millard Counties, Utah" were prepared by Seegmiller International, ~~is~~ and are included in ~~Appendix~~ Appendices Nos. 15. and No. 16 ~~This~~ The reports ~~is~~ are included ~~to provide~~ the following information ~~on the limestone and shale materials at the Quarry including the following~~:

   (A) ~~The preliminary~~ A detailed evaluation of the stability variables including geologic discontinuities, rock mass, shear strength and groundwater; and

   (B) Analysis of the stability of various slope areas for planar, wedge, toppling and rotational shear failure.

   (C) Recommendations for highwall design based on slope stability analyses.

105.3.17 Reclamation activities and treatment map

Response:

A map entitled "Reclamation Activities & Treatment Proposed Area To Be Reclaimed and Revegetated" has been prepared at a scale of 1 inch to 400 feet. This map is included in Appendix No. 6 of this NOI.

The Reclamation Activities and Treatment map shows the aerial extent of the present Quarry and the location of related Quarry facilities, such as the crusher and conveyor. The map also identifies the final dump toe of the waste rock storage area, the Plant "manufacturing area", existing ponds~~, a new proposed pond~~, and roads, etc. Proposed areas to be reclaimed and re-vegetated by the Permittee are also shown on the map.

The operations described in the original mine permit application, which was submitted to the Division in December, 1979, estimated disturbance to be approximately 273 acres as follows:

DESCRIPTION	ORIGINAL PERMIT ACRES
Mfg. & Raw Mtl. Storage	45
Quarry	177
Quartzite Quarry	7
Waste Dust Disposal	44
Total:	273 Acres

A map entitled "Comparison of Original Bonded Area to Present Disturbance Limit" was constructed for this NOI. The purpose of this map is to show a comparison of: (A) the original disturbance area estimated by the original Permittee in 1979 to include 273 acres; (B) the ~~1992~~ 2006 disturbance limit estimated to be approximately ~~"218"~~392 acres and (C) the ~~Present~~ Proposed Limit of Disturbance of ~~589~~ 731 acres. This map is included in Appendix No. 10 of this NOI. ~~This map also shows the location of areas that total approximately 19 acres that the Operator has reclaimed and seeded.~~

In 1995 the Operator estimated that "...there are 220 acres of disturbed land...and it is projected that this number will increase to 300 acres over the next 8 years, and continue to increase throughout the life of the mine." This estimate did not include acreage for the proposed mining of the Northeast reserve block. Based on that observation, an estimated annual disturbance of 10 acres per year could be expected. However, this figure does not necessarily represent additional disturbed acreage. It is a combination of additional disturbed acreage and acreage disturbed by moving lower on the same bench, i.e. disturbing the same land but at greater depths.

The disturbance limit boundary has been revised and re-drawn to enclose all lands that currently have been disturbed. ~~and certain undisturbed "island" areas that were not included in the disturbance limit boundary of the original mine permit application submitted in 1979.~~

The area of the Present Disturbance Limit Boundary was determined from aerial photography and its extent verified on the ground by the Operator. The disturbed acreage was determined by AutoCAD Map 2000 software. The ~~Present~~ Proposed Life of Quarry Limit of Disturbance boundary was determined to include ~~589~~ 731 acres, as shown on the black and white aerial photograph of the Leamington Plant and Quarry included in Appendix No. 3 of this NOI.

The Reclamation Activity & Treatment Map identifies the boundary of the Proposed Life-Of-Quarry Disturbance Limit, which includes approximately ~~669~~ 731 acres. The map also shows the extent of mining activities within this boundary. It is worth noting that although the Life-of-Quarry disturbance boundary encompasses ~~669~~ 731 acres, not all of the acreage included within the boundary will be disturbed.

105.3.18 Other maps, plans, or cross-sections

Response:

~~A series of drawings, identified as~~ Drawing~~s~~ 4-106-1 ~~through 4-106-12,~~ was prepared at a scale of 1 inch to ~~500~~ 400 feet to represent the ultimate mine map. ~~show the time sequence of the advance of mining operations during the period January 1999, through September 2059. These drawings illustrate the successive development of the quarry over time and the change in topographic contours of the Quarry area and the~~This map shows the maximum advance downward of the pit floor, and~~. The drawings also show the~~ the approximate final dump toe for the proposed shale disposal area. ~~These~~ This drawing~~s~~ is~~are~~ included in Section R647-4.106 of this NOI. Based on an extraction rate of 900,000 tons per year, the mine life is estimated at 109 years.

~~Two three-dimensional (3D) views illustrating the development of the quarry as of January 2004, and as of the year 2046, also have been prepared. These 3D views are included in Section R647-4-106 of this NOI.~~

Three ~~we~~ geologic cross-sections identified as Geologic Cross-Section A-A' Central Block, ~~and~~ Geologic Cross-Section B-B' Northeast Block, and Geologic Cross Section C-C' Southwest Block were prepared to show the relationship of the limestone and shale beds that will be mined. The geographic location of these geologic cross sections are indicated on Drawing~~s~~ 4-106-1 ~~through 4-106-12~~. These cross-sections are included in Section R647-4-106 of this NOI as Figures 4-106.9-~~11~~A, 1B, and 1C ~~and 4-106.9-3~~.

105.4 Photographs

Response:

A ~~black and white~~color aerial photograph, which was flown and taken on ~~May 7, 1999~~June 11, 2006, is included in Appendix No. 3 of this NOI. This photograph shows the Present Limit of Disturbance Boundary for mining and manufacturing operations. The Operator has marked this Present Limit of Disturbance in the field on the ground.

R647-4-106. Operation Plan

106.1 Type of mineral(s) to be mined;

Response:

Limestone and shale will be mined for use as raw kiln feed for the manufacture of Portland cement. The stratigraphic nomenclature and the depositional relationships of these units are shown in Figure 4-106.1-1.

106.2 Type of operations to be conducted, including the mining/processing methods to be used.

Response:

The existing mining operation is an area surface mine operated for the quarrying of rock to be used as a raw material in the manufacture of Portland cement. Mining operations include drilling, blasting, loading broken rock, transportation of rock, crushing rock and rock storage. After being conveyed from the quarry operation, the rock is pulverized and blended with other raw materials to produce kiln feed for the manufacture of Portland cement. All mining operations are conducted by the use of conventional mining equipment, including drills, 100-ton haul trucks, dozers, grader, trackhoe, loaders, feeder breakers, belt conveyors and a stacker/reclaimer. No deleterious materials have been or are anticipated to be encountered during mining. Deleterious materials used as part of operations are handled appropriately, as detailed in Section 107.1.12. The following is a summary of the mining operation to be conducted:

MINE PLAN SUMMARY

The mine plans presented ~~were developed from a recently updated computer geologic model. The model~~ was prepared using ~~two Minex software modules. The data imported into the software included~~ all available core drill hole data, as well as chemical analysis from approximately 200 blast holes. Highwall geometries were designed to conform to the recommendations provided by rock slope stability analyses performed for the pit. ~~The new geologic model provided more accurate design information for improved volumetrics, mine slope design and resource recovery estimates. The new model also used a topographic surface prepared from aerial photography flown in April 1998.~~

~~The outline of the mine plan focused on the Central and Northeast blocks of the limestone resource. The plan began at projected bench faces available at the beginning of January 2000.~~ The quarry benches are designed to be 60 feet high with a face slope of 87 degrees. The final highwall slope is planned to be 63.4 degrees or 2.0 vertical to 1.0 horizontal when the final pit walls are in L4 and L3 limestones. A final pit slope, including the quarry end-walls, of 45 degrees (1v:1h) will be maintained where the quarry walls are in material other than the L4 or L3 limestones.

FIGURE 4-106.1-1 - STRATIGRAPHIC COLUMN

In order to minimize rockfall and rotational slope failure hazards, three 50-foot wide step-outs will be constructed on the south slope of the Central Pit at the 5,800-, 5,500-, and 5,300- foot elevations.

Approximately ~~1,200,000~~900,000 tons of limestone are scheduled to be recovered each year. The total resource recovery for the life of the mine plan is estimated to be approximately ~~75~~ 98 million tons. The new mine design does not neutralize additional limestone reserves projected to be located to the southwest of this proposed mine plan. The quarry life is estimated to be ~~62~~ 109 years. However, it should be noted that certain conditions could exist that may affect the rate of extraction of the resources, as well as the sequencing and benching plan that has been developed. These conditions may include, but are not be limited to, economical, geological and/or physical constraints.

The shale removed from between the limestone beds and any poor quality limestone ~~has been~~is disposed of in a shale disposal site adjacent to the crusher location. Under current mining conditions, approximately 85,000 cubic yards of waste rock is stockpiled at this location annually. Eventually, additional waste rock storage locations will be required, such as on the pit floor, which will be submitted for approval in updated versions of this NOI.~~By year 2018, the waste area will have accumulated approximately 1.1 million tons of waste material. Starting in year 2019, sufficient room will be available in the mined out area of the central quarry to accommodate future waste material.~~ The top surface elevation of the shale dump will be the 5,400 foot level. The length of the long axis of the dump area will be from north coordinate N446200 to N444000.

The quarry operations will drill and blast the rock prior to excavation. A loader and off-highway trucks will remove the blasted material to either the waste dump site or the current in-pit crusher. Support crawler dozers, graders, water trucks and utility trucks will be used to maintain the roads and surfaces needed by the mobile production equipment.

106.3 Estimated acreages proposed to be disturbed and/or reclaimed annually or sequentially.

Response:

The life of the proposed Quarry operation, as presently planned, will extend for a period of about ~~62~~ 109 years. The proposed operations will disturb approximately 229 acres within the pit and 28 additional acres in the area immediately surrounding the pit.

FIGURE 4-106-9-1 - CROSS-SECTIONAL VIEW CENTRAL RESERVE BLOCK

REPLACED WITH FIGURES **4-106-9-1A,1B,1C**

DRAWING 4-106-1 - ~~CENTRAL RESERVE BLOCK~~ULTIMATE MINE MAP

DRAWING 4-106-2 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-3 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-4 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-5 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-6 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-7 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-8 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-9 - CENTRAL RESERVE BLOCK

REMOVED

DRAWING 4-106-10 - CENTRAL RESERVE BLOCK

REMOVED

FIGURE 4-106-9-2 - 3-D VIEW CENTRAL RESERVE BLOCK

REMOVED

FIGURE 4-106-9-31A,1B,1C - CROSS-SECTIONAL VIEW CENTRAL, NORTHEAST, AND SOUTHWEST RESERVE BLOCKS

DRAWING 4-106-11 - NORTHEAST RESERVE BLOCK

REMOVED

DRAWING 4-106-12 - NORTHEAST RESERVE BLOCK

REMOVED

FIGURE 4-106-9-4 - 3-D VIEW NORTHEAST RESERVE BLOCK

REMOVED

~~limestone and shale~~. Additionally, other lands will be disturbed for the construction of roads, ponds, and mining facilities. A total of ~~669~~ 731 acres are included in the proposed Life-Of-Quarry Disturbance Limit, to be affected over the ~~62~~109-year life of the Quarry. Therefore, the proposed mining operations will affect about 11 acres of land annually over the life of the quarry operation. However, because of the method of mine advance is downward to progressively lower benches, as well as laterally, the quarry operations do not actually disturb this additional amount of land each year.

Due to the geology of the limestone deposit, i.e. vertical beds, and the nature of the mining operation, the mine generally advances downward over time from the top of the mountain through the vertical limestone beds to progressively lower levels. Gradually, the mine advances laterally into adjacent limestone and shale beds. This method of mining lessens the annual lateral advance of the quarry operation. Therefore, the annual acreage disturbed usually represents an advance to a lower bench level and not necessarily a disturbance of additional acreage. This mining method contains the mining operation in a smaller area but for a longer period of time.

106.4 Nature of materials to be mined, waste and estimated tonnages.

Response:

The materials to be mined are limestone, interbedded with silty, calcareous, phyllitic shales. The mine produces about 900,000 tons of limestone and about 130,000 tons (89,000 cubic yards) of waste rock (shale) annually. Due to the steep topography and thin soils in the area, it is not practical to stockpile topsoil.

Table 4-106.4-1, Total Schedule Quality Report for the Life of Quarry, provides estimates of the volume and tonnages of limestone and shale to be mined and removed. This table shows these quantities by year and by stratigraphic interval, i.e. limestone L3 and shale S3, over the proposed life of the Quarry. The table also shows the quality of the rock resources ~~as determined from the computer block model~~. The Operator has marked this table **CONFIDENTIAL** and requests that this information be held **CONFIDENTIAL** under the provisions of Section R647-4-115 of the Division's Rules.

106.5 Existing soil types.

Response:

The existing soils in the Proposed Permit Boundary are described in the June 1984 report entitled "Soil Survey of Fairfield-Nephi Area Utah, Parts of Juab, Sanpete and Utah Counties" (the NRCS soils survey), prepared by the United States Department of Agriculture, Soil Conservation Service (now Natural Resources Conservation Service). The soil map units in the area of the Quarry are shown on the Soil Survey Map, included as Figure 4-106-5 in this section of the NOI.

Table 4-106.4-1
ASH GROVE CEMENT COMPANY- LEAMINGTON QARRY UTAH
TOTAL SCHEDULE QALITYREPORT FOR THE LIFE-OF-QARRY

CONFIDENTIAL

PERIOD AND LOCATION	SHALE (TONS)	IN PLACE SHALE (CY)	SHALE AS WASTE ROCK (CY)	BED	LIMESTONE (TONS)	CaO (%)	MgO (%)	K_2O (%)	Na_2O (%)	Fe_2O_3 (%)	SiO_2 (%)	Al_2O_3 (%)
2008-2013 EST. ANNUAL PRODUCTION	129,000	57,912	86,869		907,000							
NORTHEAST PIT				L3	217,680	51.11	1.58	0.27	0.11	0.48	3.09	1.54
				L4	507,920	50.24	1.78	0.32	0.09	0.36	4.73	1.02
	3,870	1,737	2,606	S2		15.04	1.92	2.99	0.24	6.39	38.24	19.20
	34,830	15,636	23,455	S3		27.99	2.03	2.77	0.20	3.68	26.57	11.59
CENTRAL/SOUTHWEST PITS				L3	18,140	51.11	1.58	0.27	0.11	0.48	3.09	1.54
				L4	163,260	50.24	1.78	0.32	0.09	0.36	4.73	1.02
	90,300	40,539	60,808	S3		27.99	2.03	2.77	0.20	3.68	26.57	11.59
LIFE OF QARRYEST. TOTAL PRODUCTION	27,611,148	12,395,577	18,593,366		97,920,895							
NORTHEAST PIT				L1	8,008,544	49.89	2.13	0.37	0.06	0.52	3.87	1.27
				L2	2,501,806	44.81	2.23	0.59	0.21	1.41	8.73	3.88
				L3	5,994,866	51.11	1.58	0.27	0.11	0.48	3.09	1.54
				L4	17,257,556	50.24	1.78	0.32	0.09	0.36	4.73	1.02
	1,874,778	841,651	1,262,476	S1		15.14	1.96	3.19	0.45	5.54	38.59	17.44
	781,799	350,976	526,464	S2		15.04	1.92	2.99	0.24	6.39	38.24	19.20
	4,072,982	1,828,499	2,742,749	S3		27.99	2.03	2.77	0.20	3.68	26.57	11.59
CENTRAL/SOUTHWEST PITS				L3	23,966,634	51.11	1.58	0.27	0.11	0.48	3.09	1.54
				L4	40,191,489	50.24	1.78	0.32	0.09	0.36	4.73	1.02
	20,881,590	9,374,451	14,061,677	S3		27.99	2.03	2.77	0.20	3.68	26.57	11.59

2008-2013 estimated annual production based on 2007 production. Actual production may vary depending on market conditions.
The life of quarry total production was calculated by finding the volume between the ground surface surveyed June 2006 and the ultimate mine map contours presented in the March 2007 NOI. The volumes were calculated using AutoLand Desktop Design 2007 AutoCAD Software
Shale tonnages (2008-2013) are taken from the tonnage of material stockpiled as waste rock and may actually contain up to 15% limestone
Shale tonnages (Life of Quarry) are taken from the calculated volume of shale as determined by drillhole data
Shale volumes are calculated from tonnages assuming a density of 165 pcf for in-place shale and a density of 110 pcf for waste rock

FIGURE 4-106-5 - SOIL MAP

The NRCS soil survey generally describes the soils in the area of the existing and proposed mining operations as dominantly well drained and somewhat excessively drained, sloping to very steep soils and barren rock outcrop on hillsides, ridges, and mountainsides.

More specifically, the soils identified in the area of the existing and proposed mining operations are as follows:

Rhf - Rock outcrop-Lodar complex (30 to 70 percent slopes);
Ldf - Lodar-Rock outcrop complex (30 to 70 percent slopes);
Ddc - Donnardo stony loam (2 to 8 percent slopes); and
PK - Pits-Dumps complex.

The majority of the area affected by the existing and proposed quarry operations is mapped as Rock outcrop-Lodar complex (Rhf) with 30 to 70 percent slopes and Lodar-Rock outcrop complex (Ldf) with 30 to 70 percent slopes. The remaining area is mapped as Donnardo stony loam (Ddc) with 2 to 8 percent slopes and Pits-Dumps (PK) complex. These existing soil complexes are described as follows:

Rock outcrop-Lodar complex (Rhf).

This map unit is on hillsides. Slopes are long and convex. In most areas the present vegetation is mainly grasses and shrubs. The unit is about 70 percent Rock outcrop and 20 percent Lodar very cobbly loam, 30 to 70 percent slopes. The components of this unit are so intricately intermingled that it was not practical to map them separately at the scale used. Included in this unit are about 5 percent Amtoft stony loam, moist, 30 to 70 percent slopes; and 5 percent Saxby very cobbly loam, moist, 30 to 70 percent slopes, both on south-facing hillsides. The Lodar soil is shallow and somewhat excessively drained. It formed in colluvium and residuum derived dominantly from limestone. Rock outcrop consists of exposures of barren bedrock, mainly on escarpments and ridges. This unit is used for wildlife habitat.

Lodar-Rock outcrop complex (Ldf).

This map unit is on hillsides. Slopes are long and convex. In most areas, the present vegetation is mainly grasses and shrubs. The unit is about 60 percent Lodar very cobbly loam, 30 to 70 percent slopes, and 20 percent Rock outcrop. The components of the unit are so intricately intermingled that it is not practical to map them separately at the scale used. Included in this unit are about 10 percent Lodar very cobbly loam, 3 to 30 percent slopes on hillsides; and 5 percent Borvant cobbly loam, 8 to 25 percent slopes; and 5 percent Donnardo stony loam, 8 to 25 percent slopes on alluvial fans.

Permeability of the Lodar is moderate. Available water capacity is about 1 to 1.5 inches and water supplying capacity is 2 to 4

inches. Effective rooting depth is 10 to 20 inches. The organic content of the surface layer is 1 to 4 percent. Runoff is medium and the hazard of erosion is slight. The Rock outcrop consists of exposures of barren rock, mainly on escarpments and ridges. This unit is used as rangeland and for wildlife habitat.

Donnardo Stony loam (Ddc).

This very deep, well-drained soil is on alluvial fans. The soil is formed in alluvium derived dominantly from sandstone, limestone and quartzite. Slopes are medium in length and are convex. In most areas, the present vegetation is mainly grasses and shrubs. Included in this unit are about 5 percent Donnardo stony loam, 8 to 25 percent slopes; 5 percent Pharo very stony loam, 3 to 10 percent slopes; 5 percent Borvant cobbly loam, 2 to 8 percent slopes; and 5 percent Juab loam, 2 to 4 percent slopes.

Permeability of the Donnardo soil is moderately rapid. Available water capacity is about 4.5 to 7 inches. Water supplying capacity is 6 to 9 inches. Effective rooting depth is 60 inches or more. The unit is used as rangeland and wildlife habitat.

Pits-Dumps complex (PK).

This map unit consists mainly of mine pits and associated tailing dumps. Unless it is reclaimed, this unit generally produces very little vegetation and is severely limited for most uses.

106.6 Plan for protecting and redepositing existing soils.

Response:

The soils, as described above, in the proposed mining area are not prime farmland soils and are generally rocky and poorly developed. It is considered impractical in most cases to ~~The Operator does not propose to~~ remove, store and redeposit ~~any~~ existing soils due to the combination of thin, poorly developed soils and steep slopes surrounding the pit. When practical, the operator will place topsoil in bermed, revegetated, stockpiles so that it can be redeposited during reclamation.

106.7 Existing vegetative communities.

Response:

The original permit application contained an Environmental Assessment Input report prepared by Mr. Benton M. Smith, Range Conservationist with the Fillmore Ranger District, Fishlake National Forest. A copy of this report is included in Appendix No. 11 of this NOI. This Environmental Assessment Input report summarized the range resource within the area, which was proposed to be affected by the mining operation and described the range resource as follows: "The range resource within the area which would be affected by the proposal consists of the following:

Vegetation Type	Condition	Approximate Acres
Suitable sagebrush	Poor	230
Unsuitable browse-shrub	Good	30
Unsuitable-pinyon-juniper	Poor	200
Barren	-	70
	Total	530

Range analysis records indicate that the sagebrush type produces about 223 lbs/acre of air-dry forage. Assuming that the forage is all available to livestock and allowing 50 percent utilization of the forage on the suitable sagebrush type, this produces approximately 25 animal unit months of feed per year, or 5 percent of the current grazing obligation on the Fool Creek Allotment. However, due to the lack of available water on this part of the allotment, cattle are not able to fully utilize the forage in this draw, except for short periods following rainstorms. This lessens the importance of the area for livestock grazing.

Range conditions and grazing use are expected to remain relatively unchanged in the foreseeable future except for natural, successional changes. The potential for vegetation manipulation to improve the forage production is good, but the potential to develop water for livestock on the National Forest land is poor."

Mr. Benton M. Smith further reported, "No threatened or endangered plants are known to grow in the area."

According to the NRCS soil survey of Fairfield-Nephi Area, Utah, prepared by the United States Department of Agriculture, the soil units mapped on the area of the present and proposed quarry include the following:

Rhf - Rock outcrop-Lodar complex (30 to 70 percent slopes);
Ldf - Lodar-Rock outcrop complex (30 to 70 percent slopes);
Ddc - Donnardo stony loam (2 to 8 percent slopes); and
PK - Pits-Dumps complex.

The potential plant community on these soil complexes is as described by the U. S. Department of Agriculture as follows:

1. Rhf - Rock outcrop-Lodar complex (30 to 70 percent slopes). This unit is about 70 percent Rock outcrop which consists of exposures of barren bedrock, mainly on escarpments and ridges. The remaining 30 percent of the unit is Lodar very cobbly loam. The potential plant community on the Lodar is about 65 percent perennial grasses, 10 percent forbs,

and 25 percent shrubs. Important species are:

Bluebunch wheatgrass
Black sagebrush
Nevada bluegrass
Sandberg bluegrass
Indian ricegrass

Because of the steepness of slope and the shallow depth of soil, grazing management practices are poorly suited to this unit.

2. Ldf - Lodar-Rock outcrop complex (30 to 70 percent slopes).
The potential plant community on this soil is about 65 percent perennial grasses, 10 percent forbs, and 25 percent shrubs. Important species are:

Bluebunch wheatgrass
Black sagebrush
Nevada bluegrass
Indian ricegrass

Because of the steepness of slope and the shallow depth of soil, grazing management practices are poorly suited to this unit.

3. Ddc - Donnardo stony loam (2 to 8 percent slopes).
The potential plant community on this soil is about 65 percent perennial grasses, 15 percent forbs, and 20 percent shrubs. Important plant species are:

Wyoming big sagebrush
Bluebunch wheatgrass
Indian ricegrass

This unit is suited to range seeding. The main limitation is the content of rock fragments. Plants suitable for seeding include Whitmar wheatgrass, slender wheatgrass, and species of the plant community for which seed or stock is available.

4. PK - Pits-Dumps complex.
Unless it is reclaimed, this unit generally produces very little vegetation and is severely limited for most uses.

106.8 Depth to groundwater, extent of overburden and geologic setting.

Response:

The depth to groundwater level is measured on an approximate quarterly basis in the Plant water supply well (USGS well number

(C-14-3)33bbb-2). The depth to water level recorded on March ~~35~~, ~~1999~~ 2007 was ~~43.77~~46.1 feet below the land surface datum of 4,828 feet. The depth to water level has averaged 44.5 feet below the land surface datum over the period January 24, 1994, to March ~~35~~, ~~19992007~~.

The depth of the overburden, as indicated by the Fairfield-Nephi area soil survey report, the type of soil map units in the area of the Quarry and actual mining experience varies from several feet to zero feet. In many areas of the Quarry, bare rock is exposed with little or no overburden present.

The limestone beds mined at the quarry are of Cambrian Age. The beds have been overturned and are near vertical, as shown in the geologic cross-sections included in this submittal. The limestone beds are interbedded with phyllitic shales and calcareous siltstones. The stratigraphic relationships of the limestone and shale beds are shown on the Stratigraphic Column, Figure 4-106.1-1, previously referenced in this section of the NOI. The Dome Limestone Formation, referred to as L3 in this NOI, and the Swasey Limestone, referred to as the L4 limestone, will be the principal limestone resource mined over the life of the Quarry. The Whirlwind Shale, referred to as the S3 shale, lies between the L3 and L4 limestone beds. The S3 shale will also be mined. The lowermost shale, the Pioche Formation, is underlain by the Tintic Quartzite. This quartzite has been mined on site in the past by the Operator for use as a silica source. The quartzite is not presently mined, but may be mined in the future as a supplemental source of silica.

106.9 Proposed location and size of ore and waste stockpiles, tailings facilities and water storage/treatment ponds.

Response:

There are no tailings facilities or water storage/treatment ponds located on the Quarry site.

The limestone and shale mined from the Quarry are transported by conveyor to a central storage area and stacker located adjacent to the Plant. The location of this storage area is shown on the Surface Facility - Plant Map included in Appendix No. 4 of this NOI.

~~The revised mine plan for the Quarry proposes the construction of o~~One out-of-pit waste rock disposal area has been constructed~~. This stockpile will be located~~ adjacent to and west of the present crusher and conveyor belt line. The waste stockpile ~~will~~ begins at an elevation of about 5,380 feet, extends downslope to an elevation of about 5,125 ~~to 5,360~~ feet, and contains approximately 405,000 cubic yards of material. The ~~waste~~ stockpile will ~~extend downslope to the approximate final dump toe at an elevation varying from 5,100 to 5,340 feet and~~ ultimately extend approximately 2,500 feet to the southwest from the present conveyor belt line and will have a capacity of approximately 1,000,000 cubic yards. Pond #7 accepts all runoff from the stockpile. 106-27

R647-4-107. Operation Practices.

107.1 Public safety and welfare.

107.1.11 Closing or guarding of shafts and tunnels.

Response:

There are no shafts or tunnels known to the Operator to exist within the Proposed Permit Boundary.

107.1.12 Disposal of trash.

Response:

Waste material at the Leamington Plant and Quarry, depending on the nature of the material, is disposed of by a variety of generally acceptable practices as described below:

MATERIAL	DISPOSAL METHOD
Used oil	Offsite disposal by commercial recycler (~~Advanced Petroleum Recycling~~Safety Kleen)
Heavy greases	Offsite disposal by commercial recycler (Safety Kleen~~Van Waters and Rogers~~)
Solvents (Safety Kleen)	Offsite disposal by commercial recycler
Paint wastes (Van Waters and Rogers)	Offsite disposal by commercial recycler
Process waste water Storm water	Used for cooling in on-site mills Granted "~~Total Containment~~Non-Discharge Status" by Utah Department of Environmental Quality Division of Water Quality.
Scrap metal and empty drums	Offsite disposal (~~Swenson~~ Western Metal Salvage)
Office waste and General trash	Millard County Landfill (haulage by delta garbage service)
Used refractory material	Recycled through the kiln as raw material(No chrome brick)
Plant sweepings From pavement sweeper	Recycled through the kiln.
Fabric filter dust collector bags	Juab County Landfill

Biodegradable vegetation material that has been grubbed and cleared from the Quarry site may be buried in the waste rock disposal area. Materials that can be salvaged, including tires, metal, etc., are reclaimed and transported off site for disposal by a commercial recycler. For example, waste oils are collected and picked up by a contractor and transported off site for recycling.

All hazardous materials are stored and handled appropriately. They are clearly labeled, stored in designated locations, and disposed of within 180 days. Hazardous wastes are stored in the Universal Waste Storage Building next to the Control Center and in a designated storage shed next to the crusher. The facility complies with an approved Spill Prevention Control and Countermeasures Plan (SPCC) which requires that specific operating procedures, control measures, and countermeasure plans be followed.

107.1.13 Plugging or capping of drill, core holes.

Response:

All drill and core holes, except for blast holes, are plugged or capped immediately after drilling. The locations of known drill holes are shown on the Geologic Control Map included in Appendix No. 8 of this NOI. There are four monitor wells (SWDA-1, SWDA-2, SWDA-3 and SWDA-5) located in the Quarry that have not been plugged. These monitor wells are still in use and are enclosed by a metal surround and locked. The Operator is not aware of any other drill or core holes located within the Proposed Permit Boundary that have not been properly plugged or capped. If a hole is located, in the future, that has not been plugged or capped, the Operator will notify the Division and plug the hole in accordance with applicable rules and regulations.

107.1.14 Posting of appropriate warning signs.

Response:

The Operator will post signs around the Proposed Permit Boundary advising the public the property is owned by Ash Grove Cement Company and is the site of a quarry operation.

Additionally, the Operator will mark the location of the Present Disturbance Limit Boundary by the use of steel T-posts driven in the ground. A piece of white PVC pipe will be placed over the T-posts to increase visibility. This will provide a visible line-of-sight marking of the Present Disturbance Limit Boundary.

Within the Present Disturbance Limit Boundary, the Operator also has posted signs in the active Quarry area to warn of blasting and other site-specific conditions. Dangerous highwall warning signs have been posted wherever they are considered safe to install.

107.1.15 Construction of berms, fences and/or barriers.

Response:

Berms, fences and/or barriers are constructed as required by the Mine Safety and Health Administration (MSHA) pursuant to the Federal Mine Safety and Health Act of 1977 and at such other locations that may be required by the Division for safety purposes.

107.2 Drainages.

Response:

There are two small intermittent, rocky stream beds located within the Proposed Permit Boundary. These stream beds drained into the Sevier River prior to the conduct of mining and manufacturing activities. ~~Any~~ All runoff from presently disturbed areas within the Proposed Permit Boundary~~, except for runoff from the area immediately west of the rock storage facility,~~ is channeled into and retained by ~~six~~ seven existing sediment ponds.

~~Any~~ All runoff from the area immediately west of the rock storage facility ~~would~~ flows down stream and ~~off the Proposed Permit Boundary. A~~into a new sediment pond (Pond #7)~~, which the Operator estimates to be~~ measuring approximately 4.13 surface acres in size.~~, will need to be constructed to contain runoff in this area.~~ The Operator ~~is currently working~~worked with the State of Utah Department of Environmental Quality, Division of Water Quality (DEQ) ~~in~~ to ~~sizing~~ size and permit~~ting the construction of~~ this pond~~.~~ Design calculations for this pond have been included in Appendix 13 of this NOI. ~~Expected completion of the pond is anticipated sometime in the year 2002. The Operator shall take appropriate measures to avoid or minimize environmental damage in these areas~~.

107.3 Erosion control.

Response:

Operations shall be conducted in a manner such that sediment from disturbed areas is adequately controlled. The Operator will utilize appropriate erosion control measures, including but not limited to, the use of silt fencing, straw or hay bale check dams, rock check dams and/or rock riprap drop structures to control erosion in disturbed areas. Typical profiles and cross-sections illustrating the installation of these measures and structures are shown in Figures 4-107.3-1 through 4-107.3-4 in this section of this NOI.

107.4 Deleterious material.

Response:

There is no deleterious or potentially deleterious material known to exist within the area to be mined that will be removed and would result in adverse environmental affects. Handling, disposal, and storage of deleterious materials used as part of operations are discussed in Section 107.1.12.

107.5 Soils.

Response:

As discussed in Section R647-4-106.5 of this NOI, the existing soils are thin to absent, cobbly to pebbly, and for the most part

FIGURE 4-107.3-1 - STRAW OR HAY BALE CHECK DAM

FIGURE 4-107.3-2 - ROCK CHECK DAM

FIGURE 4-107.3-3 - TYPICAL ROCK RIPRAP DROP STRUCTURE - PROFILE VIEW

FIGURE 4-107.3-4 - TYPICAL ROCK RIPERAP DROP STRUCTURE - CROSS SECTION VIEW

are poorly suited for agricultural use. Utilization of the existing soils is further limited by the steepness of the slopes and low moisture conditions. The Operator does not believe it is practical, in most cases, to remove and store topsoil for use in future reclamation. Additionally, the long term nature of the Quarry operation could require storage of any topsoil that was removed for extended periods of time, i.e. up to 20 years or more. Although any desirable physical characteristics of the topsoil would remain, storage of topsoil for extended periods would result in a sterile medium, due to loss of the microbial assemblage. To the extent practicable, the Operator will remove suitable topsoil and store it in a stable condition so as to be available for reclamation.

107.6 Concurrent reclamation.

Response:

Due to the open pit nature of the Quarry operation and long-term mining in a relatively confined area, concurrent reclamation of the active pit is not practical. Areas that have been disturbed but are not routinely or currently utilized shall be kept in a safe, environmentally stable condition and protected from erosion. During operations, the Operator will reclaim other disturbed areas, such as drill sites, roads, etc. when they are no longer needed.

R647-4-108. Hole Plugging Requirements.

108.1.11 Setting a nonmetallic permaplug.

Response:

All holes, except blast holes, drilled by the Operator within the Proposed Permit Boundary will be plugged or capped in accordance with the Division's requirements.

108.1.12 Tillable farmland.

Response:

There is no tillable farmland located within the Proposed Permit Boundary.

108.2 Drill holes that encounter water.

Response:

A Geologic Control Map was prepared for this NOI to show the location of drill holes completed on the Quarry site. This map is included in Appendix No. 8 of this NOI. This map also shows the locations of monitor wells, piezometers, the Plant water supply well, survey control points, soil sample locations, outcrop points and other information.

Drill holes in the Quarry area do not typically encounter any appreciable amounts of water, other than percolation from the surface. The elevation of the active quarry is currently at and above the level of the crusher, at 5,380 feet above sea level. The elevation of the proposed final pit floor of the Quarry is projected to be at approximately 5,220 feet. This places the final pit floor considerably above the normal water table level in the vicinity of the Quarry. The water well that supplies the Plant is located at a surface elevation of 4,828 feet (top of casing). The water level in this well is measured on an approximate quarterly basis. The water varies from 53 feet below the top of the casing (4,775 feet above sea level) to 45 feet below the top of the casing (4,783 feet above sea level).

108.2.11 Artesian flow.

Response:

No artesian flow has been encountered in any of the drill or core holes completed within the Proposed Permit Boundary.

108.2.12 Significant nonartesian flow.

Response:

No significant non-artesian flow has been encountered in any of the drill or core holes completed within the Proposed Permit Boundary. Any hole that encounters significant amounts of non-artesian water will be plugged by the Operator in accordance with the Division's requirements.

108.2.12.111 50-foot cement plug.

Response:

Holes that encounter significant amounts of non-artesian flow shall be plugged by placing a 50 foot cement plug immediately above and below the aquifer(s); or

108.2.12.112 Filling from bottom up.

Response:

Holes that encounter significant amounts of non-artesian flow shall be plugged by filling from the bottom up (through the drill stem) with a high-grade bentonite/water slurry mixture. The slurry shall have a Marsh funnel viscosity of at least 50 seconds per quart prior to the adding of any cuttings.

R647-4-109 Impact Assessment.

109.1 Surface and groundwater systems.

Response:

The proposed mining operations are not expected to impact either the surface or the groundwater systems. Surface flow is minimum on the Quarry site. Most surface flow infiltrates rapidly as a result of the rocky nature of the site. The Plant is located in the mouth of a small watershed that has an area of 1.1 square miles. Any runoff from the Quarry site and Plant is collected in a series of sediment ponds and allowed to evaporate. These sediment ponds and associated diversion structures were constructed so as to allow our operation to be Granted "Total Containment Status" by the Utah Department of Environmental Quality, Division of Water Quality. Upon cessation of mining activities and as part of the reclamation plan as outlined in this NOI, these sediment ponds will be reclaimed. Also, it should be noted that no mining is proposed in the alluvial valley of the Sevier River.

As discussed in Section R647-4-108.2, the groundwater level is located considerably below the level of the current Quarry operations and the proposed level of the final pit floor at 5,220 feet.

109.2 State and federal threatened and endangered species.

Response:

There are no State or federally listed threatened or endangered species known to exist within the Proposed Permit Boundary. Dana L. Nall, District Wildlife Biologist with the U. S. Forest Service, Fishlake National Forest, Fillmore Ranger District (USFS) prepared a report in September 1994 entitled "Biological Assessment for Threatened, Endangered, and Proposed Species for the Proposed Ash Grove Cement Plant Expansion". A copy of this report is included in Appendix No. 12 of this NOI.

The purpose of this biological assessment was to analyze and evaluate the potential effects of Ash Grove's proposal to expand its existing operations to include approximately 145 acres of land that at that time was National Forest System lands. Ash Grove obtained title to these lands in the summer of 1998 in a land exchange with the U.S. Forest Service. It is assumed that the proposed development of the pit, including the 31-acre expansion of the southwest pit, will have no adverse effects on biological resources.

Nall states, in Section VII. Determination, of the Biological Assessment report: "As a result of this assessment it is my professional determination that the proposed Ash Grove Cement Plant expansion will have no effect on the peregrine falcon, bald eagle, or Mexican Spotted Owl."

The Biological Assessment report includes a response in Section III Consultation To Date, which was received from Robert G. Valentine, Director of the Utah Division of Wildlife Resources. This response states "Impacts to wildlife from this project as it is described should be minimal. The adjacent area is already heavily disturbed by the adjacent mining operations. The geomorphology of this area is steep and rocky, adding to the lack of suitable habitat for most wildlife species."

The Biological Assessment report also includes a response, in Section III Consultation To Date, from Robert D. Williams, Assistant Field Supervisor for the U.S. Fish and Wildlife Service(USFWS). Mr. Williams stated, "The U. S. Fish and Wildlife Service advises that no listed threatened or endangered species are known to occur on the project site."

As part of its biological assessment, the USFS searched the Utah Natural Heritage Program's Sensitive Species Database for occurrences of special status species that may occur within the proposed expansion area. The Biological Assessment report states, "The results of this search indicated that the database does not contain any information regarding special status species for the proposed expansion area."

109.3 Existing soil resources.

Response:

Existing soil resources are discussed in Section R647-4-106.5 of this NOI. For the reasons previously stated, no topsoil will be salvaged or stored unless it is considered practical.

109.4 Slope stability, erosion control, air quality.

Response:

The Operator conducted an investigation of the slope stability of the existing quarry in November 1997. A copy of the report entitled "Initial Evaluation Highwall Slope Stability Hank Allen Quarry" prepared by Dr. Ben L. Seegmiller of Salt Lake City, Utah is included in of Appendix No. 15 of this NOI.

Regarding slope stability, the report concluded:

- Slope undercutting discontinuities were not found.
- Rock mass strength in the limestone is very high.
- Rock mass strength in the shales is moderate to low.
- Groundwater pressurization is probably absent.
- Slope angles of 63.4 degrees (2:1) may be stable in limestone.
- Slope angles of 45 degrees (1:1) may be stable in shale.

Based upon the results from this initial study, the operator designed the slope angles of the quarry high-walls to be 63.4 degrees (2:1) in limestone and 45 degrees (1:1) in shale. All end-walls, regardless of the material were designed to be 45 degrees (1:1).

The operator contracted an additional highwall slope stability investigation in September 2001. A copy of the report entitled "Highwall Stability Evaluation, Ultimate Pit Slope Angles, Hank Allen Quarry - Leamington Plant, Central and Northeast Block Pits, Juab and Millard Counties, Utah" prepared by Seegmiller International, is included in Appendix No. 16 of this NOI.

The report makes the following recommendations:

- The Central Pit South Slope should be constructed with three step-outs (at 5,800-, 5,580-, and 5,400- feet) to mitigate safety concerns
- Interramp slope angles of 0.5:1 (63.4°) may be stable in limestone (L3 & L4) if blast damage reduction can be implemented and rockfall prevention is successful.
- Wheeler Shale (S4) may be stable with 1:1 (45°) slopes, and Chisolm Formation (S1, S2) may be stable with 2:1 (26.6°) slopes.

~~recognizes that there still exists a need to provide further slope stability investigations and ongoing testing will be necessary to prove these slope angles to be stable. The operator will commit to perform the additional testing as outlined in the recommendations made in Dr. Seegmiller's report. Testing should begin by the summer of 2002.~~

The pit has been designed largely according to the recommendations detailed in the highwall stability investigation. Step-out benches are planned at the 5,800-, 5,500-, and 5,300- foot elevations. The lowest step-out bench is 100 feet lower than what is recommended in the Seegmiller International report, but this bench is not planned for to be completed until at least 2025. The precise location of this lowest step-out bench may be adjusted pending results of future analyses. All pit design changes (if necessary) will be filed with the Division. ~~Results from these studies will allow for additional analysis of slope stability and will be part of an ongoingincorporated into pit design planning performed by the operatorsystem. All reports, results, and pit design changes (if necessary), will be filed with the Division.~~

The Operator will use appropriate measures, such as fabric fences, check dams, etc., to control erosion. The Operator presently uses a water truck and a sprinkler system to control fugitive dust emissions from access and haul roads in the Quarry. The facility operates under an approved Title V Operating Permit (#2300015002) issued by the Utah Division of Air Quality.

The Operator limits access to the Plant and Quarry operations for

public safety. The Operator has marked the boundary of the Present Disturbance Limit to make it more visible to the public. The operator will also post signs along the perimeter of the Proposed Permit Boundary to advise the public of the Quarry operations.

109.5 Proposed mitigation of impacts.

Response:

No additional mitigation is proposed.

R647-4-110. Reclamation Plan.

110.1 Current land use and proposed post-mining land use.

Response:

The current land use for the Plant and Quarry areas within the Present Disturbance Limit is industrial/commercial. Specifically, the current land use is mining for the area included in the existing Quarry operations and is manufacturing for the area included in the existing Plant operations. The current land uses for lands outside of the Present Disturbance Limit, but within the Proposed Permit Boundary is rangeland, which includes livestock grazing, and use by wildlife.

The proposed post-mining land uses for all disturbed lands are rangeland, which includes livestock grazing and use by wildlife.

110.2 Manner and extent of reclamation.

Response:

ROADS

All roads except for the loop that extends north from Highway 132 to the railroad (the North road - 1.2 acres) and a road that extends south from Highway 132 to the Quarry (the South road - 4 acres) will be removed, ripped and reclaimed. These short road segments will be left for property access after operations cease.

HIGHWALLS

During the process of mining, when a highwall or end wall has been constructed it is dressed and stabilized by dragging a heavy chain across the face to remove any loose debris. A three (3) foot high berm is constructed on the edge of the bench below the rock wall to catch and contain any loose material. Once a highwall or end wall has been stabilized it will not be disturbed any further. Final standing highwalls and end walls will be left to provide potential habitat and cover for raptors and other wildlife species. Highwalls in limestone will not exceed slopes of 2V:1H, highwalls in S4 shale will not exceed slopes of 1H:1V, and highwalls in S1 and S2 shales will not exceed slopes of 2H:21V.

PONDS & DRAINAGES

All surface water diversion structures and sediment ponds shall be removed and the areas reclaimed. Pond embankments that were constructed will be removed to allow natural drainage systems to be re-established. Pond #1 which is located in the quarry will be filled with waste rock to the level of the final pit floor.

PIT FLOOR

Although previously approved submittals of this NOI specifically mentioned that no efforts would be made to revegetate the floor of the pit, the operator will attempt to revegetate a portion of the pit floor as part of reclamation. The area to be revegetated will be at least equal to the increase in acreage between the previously approved and proposed pit floor areas. Thus, since the previously approved pit floor was approved to reach approximately 46 acres without requiring revegetation, if the pit floor reaches its maximum area of 114 acres, the operator will attempt to revegetate a total of 68 acres of the pit floor. The areas selected for revegetation will be those considered to be most economical to revegetate, have the greatest chances for success, and have the lowest potential to exacerbate sediment runoff. Prior to revegetation, crushed rock on the pit floor will be amended with organic material, roughened, and revegetated with a seed mixture as shown in Table 4-110.1 or approved by the Division at the time of seeding.

WASTE ROCK STORAGE AREAS

The proposed waste rock stockpile will be constructed to be a stable slope of 1.5H:1V~~approximately 30 degrees.~~ and will cover 29.0 acres. Runoff and erosion will be managed by surface roughening, mulching, and revegetation. Prior to revegetation, this area will be covered by fine-grained soil material obtained from the storage stockpile area located just north of the waste rock stockpile. Soil amendments may be added in order to increase the organic content of the soil and thus improve revegetative success. The waste rock pile~~It~~ will be re-vegetated by seeding with a seed mixture as shown in Table 4-110.1 or approved by the Division at the time of seeding.

Approximately 2.75 million cubic yards of waste rock will be generated while mining the Southwest Pit. For the next several years of operation, approximately 85,000 cubic yards of additional waste rock will be stockpiled at this location annually. Eventually, additional storage locations will be required, which will be submitted for approval in updated versions of this NOI.

PowerSieve uses normal photographs of the blasted rock that are digitally scanned to determine the distribution of rock fragment sizes. To determine the size distribution of the rock in the photographs, it is necessary to have a reference scale. In the field tests, a basketball, which is approximately 32 centimeters in diameter, is used as a reference scale. Using the reference scale, it is possible to use the software to measure the diameter of the rock fragments in the photographs.

After the photographs are digitized, the software plots graphs showing the distribution of the rock fragment sizes for limestone and for shale. The graphs show the X-axis as the size of the sieve in meters and the Y-axis as the percentage passing that size of sieve. The combined results of the analyses performed for all shale photographs taken at the Quarry are shown on the graph in Figure 4-110-2-1 of this NOI. The combined results of the analyses for all limestone photographs taken at the Quarry are shown on the graph in Figure 4-110-2-2. These graphs are included in this section of the NOI.

Both the limestone and shale cumulative size distribution at the Quarry exhibit a narrow size range from powder size up to a larger size of 0.20 meters (approximately 8 inches). Using the current blasting

design produces, a run-of-mine rock size distribution where more than 50 percent of the limestone and shale is less than 0.05 meters in size (approximately 2 inches and less). This analysis provides data that shows the particle size in the waste rock storage areas will contain sufficient fines to allow re-vegetation and successful growth of vegetation to reclaim these areas.

~~TABLE 4-110-2-1 - ROCK FRAGMENTATION SIZE - COMBINED SHALE RESULTS~~
~~Insert Table here and discard this page!~~REMOVED

~~TABLE 4-110-2-2 - ROCK FRAGMENTATION SIZE - COMBINED LIMES RESULTS~~
~~Insert table here and discard this page!!REMOVED~~

110.3 Surface facilities to be left as part of postmining land use.

Response:

All features such as buildings, roads (except for two discussed above), pads, or other structures will be removed and the areas reclaimed during the final reclamation process.

110.4 Description of the treatment, location and disposition of any deleterious or acid-forming materials generated and left on-site, including a map showing the location of such materials upon the completion of reclamation.

Response:

There are no deleterious or acid-forming materials known to be present on the site.

110.5 Planting program as best calculated to re-vegetate the disturbed area.

110.5.11 Plans shall include, at a minimum, grading and/or stabilization procedures, topsoil replacement, seedbed preparation, seed mixture(s) and rate(s), and timing of seeding (fall seeding is preferred timing).

Response:

Disturbed lands, where required, will be ripped to reduce compaction, rough graded to re-establish contours and drainage and final graded to slopes suitable for use of mobile equipment, as may be required, for the preparation of seedbeds and re-vegetation.

Appropriate stabilization methods, including but not limited to, rock, straw or hay bale check dams, geotextile fabric fences, berms, etc. will be used to control erosion and stabilize slopes and disturbed lands.

Disturbed areas, except for barren rock highwalls, and portions of the pit floor will be graded and stabilized, and seeded in either the fall (preferred) or spring. Prior to seeding, the Operator will contact the Division to confirm the recommended seed mixture. It is anticipated that a seed mix similar to the one shown in Table 4-110-1 of this NOI will be used.

SOIL FERTILITY

Reconstructed soil materials will be tested for fertility prior to commencement of re-vegetation operations. Laboratory results will be used to calculate the amounts and types of amendments needed to provide a suitable rangeland plant community environment. Based on laboratory analysis, the need for fertilizers and other amendments will be made. When soil supplements, fertilizers or other amendments are required or desirable, they will be applied properly per the manufacturer's specifications.

REVEGETATION SPECIES

Reclamation of the Quarry will be accomplished by planting a diversified mixture of grasses, forbs and shrubs approved by the Division. The plant community that is established by this seed mixture will support the postmining land use of rangeland, which includes livestock grazing and use by wildlife. The seed mixture shown on Table 4-110-1, or as recommended by the Division at the time of reclamation, is proposed for use for permanent re-vegetation of lands disturbed by mining. The seed mixture contains a variety of species, including drought resistant varieties that grow in the region of the Quarry and are adapted to the environmental conditions that may be found at or near the Quarry site.

The species contained in this permanent re-vegetation seed mixture may be substituted, or their percent composition, varied from year-to-year based on commercial availability and actual site performance. However, the Division will be consulted prior to such substitutions being made. Actual purity and germination values for specific seed lots will be used in formulating bulk rates for each species contained in the seed mixture each year.

SEEDING & PLANTING METHODS

Broadcasting will be the preferred method used for planting seed. Broadcasting will be accomplished by both ground and aerial means, depending on the steepness and safe accessibility of the ground surface. When properly conducted, broadcast seeding is usually superior to drill seeding for establishment of native species seed mixtures. The main advantage realized by broadcast seeding in reclaiming rangeland is that it distributes seed more evenly across the ground surface. This limits the competition between seedlings and young plants. Broadcasting also maximizes the nutrient and water availability for seedlings and young plants.

Table 4-110-1

ASH GROVE CEMENT COMPANY - LEAMINGTON QUARRY, UTAH
PERMANENT REVEGETATION SEED MIXTURE

SCIENTIFIC NAME	COMMON NAME	SEEDING RATE	
		TTL PLS LBS	PLS LBS/ACRE
Penstemon eatonii	Eaton's penstemon (Firecracker)	0.5	0.50
Penstemon palmeri	Palmer Penstemon	0.5	0.50
Agropyron intermedium	Intermediate wheatgrass	2.0	2.0
Dactylis glomerata var. Piaute	Piaute Orchardgrass (drought resistant variety)	1.0	1.0
Kochia prostrata	Forage Kochia (subshrub)	0.5	0.5
Chrysothamnus nauseosus	Rubber Rabbitbrush	0.5	0.5
Melilotus officinalis	Yellow Sweetclover	1.0	1.0
Medicago sativa var. Ladak	Alfalfa	1.5	1.5
Agropyron cristatum var. Hycrest	Crested wheatgrass	1.0	1.0
Leymus cinereus	Basin Wild Rye	2.0	2.0
Artemisia tridentate wyomingensis	Wyoming Big Sage	0.1	0.1
Achnatherum hymennoides	Indian ricegrass	2.0	2.0
TOTAL		12.6	12.6

Characteristically, this results in an optimal expression of the diversity contained in the seed mixture and fosters improved plant growth. In order to realize optimum expression of the variety of species contained in the seed mixture, broadcast seeding will be performed as soon as possible after the seedbed has been prepared.

Seed mixtures will be distributed as evenly as possible over the area being re-vegetated. Drill seeding may be employed when slopes are less than 40 percent and where soils are not excessively rocky. Broadcast seeding may be performed on all slopes and on all soils regardless of percentage of rock composition. Broadcasters may be human-powered or machine-powered as long as they are properly equipped and are capable of distributing seed evenly at the required rates. Broadcasting will not be performed when surface winds prevent the even distribution of seed. Broadcasting by hand will be used in certain areas where equipment cannot be used but are accessible safely by foot.

PLANTING PERIODS

The amount and timing of precipitation impacts the successful germination and establishment of re-vegetation plantings. Native western rangeland plants have developed various adaptations for ensuring their survival in low moisture conditions. Seed mixtures will be planted in either the fall or spring of each year at the discretion of Leamington Quarry personnel.

Germination in many western plants is triggered by certain environmental or climatic conditions. These conditions may not occur every year. As a result, full germination of the seed, contained in a diverse native plant seed mixture, on arid and semi-arid land may take one or more years to occur. Western native plant seed may remain viable for many years (5+ years). It is important to allow adequate time for seed mixture germination and establishment before deciding that re-vegetation is a failure or is substandard and initiating interseedings. Patience must be exercised in determining whether or not a specific re-vegetation seeding is a success or failure. Premature application of additional seed is a frequent practice that can adversely impact biologic diversity in western rangeland reclamation.

Seeding operations will be performed during the normal seeding period for the types of species being planted. When cool season species comprise the majority of the seed mixture, planting will normally be performed in the fall after September 15th, or in the spring prior to May 1st.

When warm season species comprise the majority of the seed mixture, planting operations may be conducted during the same periods as cool season species, except that spring seeding may be extended through May 30th. Seeding activities will be conducted as weather and soil conditions permit. Seeding will not be performed when there are more than two inches of snow on the ground.

SEED QUALITY

Certified, weed-free seed will be procured whenever possible. Seed used in permanent re-vegetation operations will be site-adapted, improved varieties and cultivars of native grasses, forbs and shrubs. Seed sources that are from the same general locality will be used whenever possible. Seed from more distant sources may be used as dictated by availability, with care being taken to match climatic zones to the extent necessary and possible.

SEEDBED PREPARATION

Seedbeds will be prepared to facilitate seedling germination and establishment. Seedbeds will be left in a rough surface condition whenever possible. Areas will be seeded as soon as possible after completion of soil reconstruction. Physical soil manipulation and re-vegetation operations will be performed on the contour, to the fullest extent possible, to minimize potential surface erosion. Specific cultural practices that promote the establishment and survival of seeded forbs and shrubs will be employed where practicable, subject to the approval of the Division.

SEED MIXTURE APPLICATION RATE

Seed mixtures will be applied at the approximate rate of 20 pure live seeds ("PLS") per square foot. Application rates may be varied with the Division's approval as the germination, establishment and growth of previous seedings are observed and evaluated. When the bulk-seeding rate for a sub-mixture is very low (i.e., less than 10 pounds/acre), an extender may be added to aid in seed mixture distribution and coverage. A commonly used extender is cracked corn, but other materials may be used providing they are environmentally benign. When extenders are used, they will be thoroughly mixed with the seed prior to commencement of seeding operations.

ALTERNATIVE WOODY PLANT ESTABLISHMENT

Bare root, tubling, or containerized native shrub and tree species may be hand planted in selected areas that may support the establishment of these species. Plant establishment may be enhanced with the use of slow-release fertilizer tabs, plant protectors and "Terrasorb" or "DRIWATER".

MULCHING

Mulching involves the application of plant residues, compost manure, or other suitable materials to the soil surface. The purpose of mulching is to conserve moisture, increase organic matter, prevent surface compaction or soil crusting, and control weeds. Mulching aids in establishing plant cover and reduced erosion and runoff, thereby protecting the quality of surface runoff. Mulching may be necessary where there is a wind or water erosion hazard, on soils with low infiltration rates or low organic matter present, on critical areas, on sites where annual precipitation is less than 12 inches, or on slopes that are greater than 3h:1v.

The preferred method to increase organic matter, when soils data indicates that it is low, will be to apply composted manure. Composted manure will be applied at the rate of five (5) tons per acre for areas that receive a minimum of six (6) inches of topsoil and ten (10) tons per acre for areas that receive less than six (6) inches of topsoil or areas where substitute topsoil materials are used. Composted manure would be applied to the surface and ripped just prior to seeding.

Hay and straw mulches may be put on areas with extreme erosion potential and shall be applied at the rate of approximately 2 tons per acre. Mulch may be spread by hand or mechanical methods. Mulch materials will be evenly and uniformly distributed over the site to be treated. All mulching materials will be certified, weed-free. To realize maximum effectiveness, mulches will be crimped, netted or tackified using standard accepted practices. Whenever possible, anchoring will be performed at right angles to prevailing winds or on the contour. Broadcasting or drilling of seed will be performed immediately following mulch applications. When seed is drilled, operations will follow crimped rows to the extent this is practicable.

SURFACE ROUGHENING/WATER HARVESTING

Ripping, land imprinting, contour furrowing or a similar surface roughening procedure may be performed to reduce surface water runoff and increase moisture harvesting. Moisture harvesting associated with surface roughening can be expected to improve soil moisture content and stimulate plant growth and development.

MONITORING AND INTERSEEDING

Re-vegetated areas will be monitored for adequate germination and establishment. Vegetation stand establishment and development will be observed annually in the later part of the growing season following seeding and may continue for several years thereafter. Stand germination and establishment may take several growing seasons before full expression of the seed mixture is realized. Many xeric plant species will not germinate until specific environmental conditions occur. Seed can remain dormant and viable for such species for many years. For this reason full expression of seeded materials may take several years to occur.

110.5.12 Where there is no original protective cover, an alternate practical procedure must be proposed to minimize or control erosion or siltation.

Response:

In some areas where there is no original protective cover, native species in tublings may be hand planted in selected areas that may be conducive to growth. These tublings will include fertilizer, stake with plastic protector to lessen rodent damage and a packaged water, cellulose gum and alum mixture, such as "Terrasorb" or "DRIWATER", to provide water and to aid in survivability.

110.6 Operator's Statement

Response:

The Operator will conduct reclamation in accordance with these rules.

R647-4-111. Reclamation Practices.

During reclamation, the Operator shall conform to the following practices, unless the Division grants a variance in writing:

111.1 Public Safety and Welfare - The operator shall minimize hazards to the public safety and welfare following completion of operations. Methods to minimize hazards shall include but not be limited to:

111.1.11. The permanent sealing of shafts and tunnels;

Response:

To the best knowledge of the Operator there are no shafts or tunnels on the property being mined. If any tunnels or shafts are encountered, the Operator shall permanently seal them as required by the Division.

1.12. The disposal of trash, scrap metal and wood, buildings, extraneous debris, and other materials incident to mining;

Response:

The Operator shall conform to environmentally protective methods for ~~the proper~~ disposal of trash, scrap metal and wood, buildings, extraneous debris, and other materials incident to mining.

1.13. The plugging of drill, core, or other exploratory holes as set forth in Rule R647-4-108;

Response:

The Operator shall plug all drill, core, or other exploratory holes as set forth in Rule R647-4-108.

1.14. The posting of appropriate warning signs in locations where public access to operations is readily available;

Response:

The Operator shall post appropriate, legible warning signs in locations where public access to operations is readily available and in the immediate vicinity of reclamation operations.

1.15. The construction of berms, fences and/or barriers above highwalls or other excavations when required by the Division.

Response:

The Operator currently dresses the highwalls by dragging a heavy chain across the face to remove any loose debris. A three (3) foot high berm is constructed on the edge of the bench below the highwall to catch and contain any loose material from the highwall. The Operator shall construct berms, fences and/or barriers above highwalls or other excavations when required by the Division. The Operator shall install a berm or fence above the highwall in locations where public access to the pits are readily available. Berms or fences will not be built in areas of difficult access such as in areas of steep natural slopes. In these locations, access is extremely difficult, and the frequency of human traffic is negligible. The hazards associated with installing protective measures would far outweigh their safety benefits.

111.2 Drainages - If natural channels have been affected by mining operations, then reclamation must be performed such that the channels will be left in a stable condition with respect to actual and reasonably expected water flow so as to avoid or minimize future damage to the hydrologic system.

Response:

If natural channels are affected by mining operations, the Operator shall perform reclamation in a manner such that the channels will be left in a stable condition with respect to actual and reasonably expected water flow, so as to avoid or minimize future damage to the hydrologic system. The location of reclamations channels can be seen on the map in Appendix 8. A typical cross-section of the channels can also be seen in Appendix 8. Table 4-111-2-1 contains the channel configurations and the maximum capacity of the reclamation channels. All reclamations channels can handle the 100-year 6-hour storm event of 2.1 inches. Reclamation channels have been designed to approximate the natural channels in the area.

111.3. Erosion Control - Reclamation shall be conducted in a manner such that sediment from disturbed areas is adequately controlled. The degree of erosion control shall be appropriate for the site-specific and regional conditions of topography, soil, drainage, water quality or other characteristics.

Response:

The Operator shall conduct reclamation in a manner such that sediment from disturbed areas is adequately controlled. The degree of erosion control shall be appropriate for the site-specific and regional conditions of topography, soil, drainage, water quality or

other characteristics.

Table 4-111-2-1						
ASH GROVE CEMENT COMPANY - LEAMINGTON QUARRY, UTAH RECLAMATION CHANNEL SUMMARY						
Channel	**Bottom Width (ft)**	**Side Slope (H:V)**	**Depth (ft)**	**Design Flow Rate (cfs)**	**Maximum Channel Capacity (cfs)**	**Erosion Control Method**
RC-1	18	5:1	2.0	328.0	457.5	Erosion control Mat*
RC-2	30	5:1	1.0	25.3	135.5	None
RC-3	0	3:1	1.5	9.2	32.3	None
RC-4	20	5:1	1.0	109.1	214.7	Erosion control Mat*
SWALE-1	5	10:1	1.5	25.3	95.9	None

Notes:

*Erosion Control Mat denotes a three-dimensional vegetation reinforcement mat such as Tensar TM-3000 or equal. Using this product allows the channel to be reinforced and still appear like an undisturbed natural channel. Channels reinforced using this method can withstand flow velocities up to 14 fps before vegetation is established and 20 fps after vegetation is established according to the manufacturer. In the worst case condition the flow velocity should not exceed 12.7 fps for the design storm event.

The design storm event is the 100-year 6-hour storm event, which is 2.1 inches of rain in a 6 hour period.

111.4. Deleterious Materials - All deleterious or potentially deleterious material shall be safely removed from the site or left in an isolated or neutralized condition such that adverse environmental effects are eliminated or controlled.

Response:

The deleterious materials encountered during reclamation are expected to be small amounts of materials identified in Section 107.1.12. They will be handled in an environmentally protective manner as specified in Section 107.1.12.~~There are no deleterious or potentially deleterious materials on the site. However, if any such material is found, the Operator shall safely remove all deleterious or potentially deleterious material from the site or leave it in an isolated or neutralized condition, such that adverse environmental effects are eliminated or controlled.~~

111.5. Land Use - Operator shall leave the on-site area in a condition capable of supporting the postmining land use.

Response:

The Operator shall leave the on-site area in a condition that is capable of supporting the proposed post-mining land use of rangeland.

111.6. Slopes - Waste piles, spoil piles and fills shall be re-graded to a stable configuration and shall be sloped to minimize safety hazards and erosion while providing for successful revegetation.

Response:

The Operator shall re-grade all waste piles, spoil piles and fills to a stable configuration. Such piles and fills shall be sloped to minimize safety hazards and erosion, while providing for successful revegetation. The out-of-pit waste rock disposal area will be constructed to a maximum slope of ~~approximately 30 degrees~~1.5 horizontal to 1 vertical.

111.7.Highwalls - In surface mining and in open cuts for pads or roadways, highwalls shall be reclaimed and stabilized by backfilling against them or by cutting the wall back to achieve a slope angle of 45 degrees or less.

Response:

The Operator has previously obtained a variance from the Division to allow highwalls of approximately 63 degrees (2v:1h) in limestone in the central area of the Quarry. The Operator is requesting a similar variance in this NOI to allow highwalls of 63

degrees (2v:1h) in limestone when mining is extended into the Northeast reserve block and the Southwest expansion area of the Quarry. The Northeast reserve block and the Southwest expansion area are shown on the Proposed Life-Of-Quarry Disturbance Limit Map in Appendix No. 9 of this NOI. When mining in shale the Operator will mine to achieve a highwall slope of 45 degrees (1v:1h) or less.

111.8. Roads and Pads - On-site roads and pads shall be reclaimed when they are no longer needed for operations. When a road or pad is to be turned over to the property owner or managing agency for continuing use, the operator shall turn over the property with adequate surface drainage structures and in a condition suitable for continued use.

Response:

The Operator shall reclaim all on-site roads and pads, except for two short road segments described below.

One road segment (the North Road), which extends from the north side of Highway 132 approximately 700 feet to the railroad, will not be reclaimed. The North Road will be left in place for use by the Division for post-mining reclamation inspection of the property, use by property owners for access to the Leamington irrigation canal and to private property located north and northeast of property owned by the Operator. The Operator (the property owner) will also use this road for access to their property adjacent to the railroad.

The second road segment (the South Road), which extends from the south side of Highway 132, approximately 0.9 mile to the south towards the mined pit, will be not be reclaimed. The South Road will be left in place for use by the Division for post-mining reclamation inspection of the property and by the Operator (the property owner) for access to their property.

The two roads to remain will be dirt roads no more than 12 feet wide. Paving materials will be removed or ground up in place prior to ripping the soil.

111.9. Dams and Impoundments - Water impounding structures shall be reclaimed so as to be self-draining and mechanically stable unless shown to have sound hydrologic design and to be beneficial to the postmining land use.

Response:

All water impounding structures will be reclaimed so as to be self-draining and mechanically stable.

111.10. Trenches and Pits - Trenches and small pits shall be reclaimed.

Response:

The Operator shall reclaim all trenches and small pits.

111.11. Structures and Equipment - Structures, rail lines, utility connections, equipment and debris shall be buried or removed.

Response:

The Operator shall bury or remove all structures, rail lines, utility connections, equipment and debris.

111.12. Topsoil Redistribution - After removal of structures and completion of final grading, any available soil materials shall be redistributed on a stable surface, so as to minimize erosion, prevent undue compaction and promote re-vegetation.

Response:

For the reasons previously explained in Sections R647-4-106.6 and 107.5 of this NOI, the Operator does not propose to remove and store topsoil materials. However, if any topsoil materials are removed and stored the Operator shall, after removal of structures and final grading, redistribute any available soil materials on a stable surface, so as to minimize erosion, prevent undue compaction and promote re-vegetation.

111.13. Revegetation - The species seeded shall include adaptable perennial species that will grow on the site, provide basic soil and watershed protection, and support the postmining land use.

Response:

The species seeded by the Operator shall include adaptable perennial species that will grow on the site, provide basic soil and watershed protection, and support the postmining land use.

Re-vegetation shall be considered accomplished when:

13.11. The re-vegetation has achieved 70 percent of the premining vegetative ground cover. If the premining vegetative ground cover is unknown, the ground cover of an adjacent undisturbed area that is representative of the premining ground cover will be used as a standard. Also, the vegetation has survived three growing seasons following the last seeding, fertilization or irrigation, unless such practices are to continue as part of the postmining land use;

Response:

The Natural Resources Conservation Service prepared a Soil and Vegetation Survey of certain lands included within the Proposed Permit Boundary. A copy of this Soil and Vegetation Survey is included in Appendix No. 11 of this NOI. Mr. Ken Sevy, Soil Conservationist, stated the Survey provided "...the present estimated percents of vegetation on the site". This estimate represents pre-mining vegetative ground cover in the area of the Quarry and Plant. The Operator proposes this estimate be used to determine pre-mining vegetative ground cover under Section R647-4-111.13.11; or

13.12. The Division determines that the re-vegetation work has been satisfactorily completed within practical limits.

R647-4-112. Variance.

1. The operator may request a variance from Rule R647-4-107, 108, or 111, by submitting the following information which will be considered by the Division on a site-specific basis:

1.11. The rule(s) as to which a variance is requested;

Response:

Ash Grove requests a variance from the following Rules:
Rule R647-4-111.7 Highwalls, and
Rule R647-4-111.8 Roads and Pads

1.12. The variance requested and a description of the area that would be affected by the variance;

Response:
Rule R647-4-111.7 Highwalls

A variance request from Rule 647-4-111.7 is made by the Operator to allow additional mining of limestone highwall slopes of 2 vertical to 1 horizontal (approximately 63 degrees) in the Central, Northeast, and Southwest reserve blocks as discussed in Section 105.3.11 and 105.3.14 of this NOI. The locations of these slopes are shown on Drawing 4-106-1 included in Section 4-106 of this NOI and on the Reclamation Activities & Treatment Map included in Appendix No. 6 of this NOI.

A variance from Rule 647-4-111.7 was previously granted to the Operator by the Division, by letter dated July 23, 1996. This variance was to allow the Operator to construct highwall slopes of 2 vertical to 1 horizontal (approximately 63 degrees). That variance was described as being applicable to the "current quarry area" as defined on maps included with Ash Grove's letter dated April 4, 1996. At the time the Operator requested this variance, mining was being conducted in what is now identified as the Central reserve block.

A separate variance request from Rule 647-4-111.7 is made by the Operator in this NOI to allow mining of highwall slopes of 2 vertical to 1 horizontal (approximately 63 degrees) in the Northeast reserve block as discussed in Section 105.3.11 and 105.3.14 of this NOI. The location of these slopes are shown on Drawings 4-106-11 and 4-106-12 included in Section 4-106 of this NOI and on the Reclamation Activities & Treatment Map included in Appendix No. 6 of this NOI.

While at this time the operator is requesting this variance additional testing as outlined in Dr. Seegmillers report and as discussed in Section 109.4 of this NOI will be ongoing. Results from this study will be part of a continuing pit design planning system and all results will be shared with the Division.

~~At a later date, the Operator intends to request a similar variance in the Southwest pit future expansion area, as shown on the Proposed Life-Of-Quarry Disturbance Limit Map in Appendix No. 9 of this NOI.~~

Rule R647-4-111.8 Roads and Pads

A variance request from Rule R647-4-111.8 is requested by the Operator in this NOI to allow two short road segments identified as the North road and the South road to be partially reclaimed after operations are completed. Pavement would be removed from the roads, which would be reduced to a width of approximately 12 feet. These road segments are described in Sections R647-4-105.3.12, 105.3.14, 110.3 and 111.8 of this NOI and their locations shown on the Reclamation Activities & Treatment Map included in Appendix No. 6 of this NOI.

~~A variance request from Rule R647-4-111.8 is requested by the Operator in this NOI to allow two short road segments identified as the North road and the South road to not be reclaimed and remain in-place after operations are completed. These roads segments are described in Sections R647-4-105.3.12, 105.3.14, 110.3 and 111.8 of this NOI and their locations shown on the Reclamation Activities & Treatment Map included in Appendix No. 6 of this NOI.~~

1.13. Justification for the variance;

Response:

Rule R647-4-111.7 Highwalls

The variance from Rule R647-4-111.7 is requested to allow the Operator to continue the same method of operation it now conducts as mining progresses in the Central and Northeast reserve blocks as well as the Southwest pit expansion area. Cutting the highwall back to achieve a slope of 45 degrees or less would disturb more of the shale units, which are not useful materials. This would result in the disturbance of additional land and create additional waste rock to be disposed of.

An identical variance to this rule was previously granted to the Operator by the Division in a letter dated July 23, 1996. This variance allowed the Operator to construct highwall slopes of 2 vertical to 1 horizontal (approximately 63 degrees). That variance was described as being applicable to limestone slopes in the "current quarry area" as defined on maps included with Ash Grove's letter dated April 4, 1996. At the time the Operator requested this variance, mining was being conducted in what is now identified as the Central reserve block.

The current variance request is justified both by the historic stability of the highwalls in the central pit and by extensive rock slope stability analyses. The 63 degree highwall slopes, as previously approved by the Division, in the central area of the Quarry have maintained stable slopes and have not caused any unstable or unsafe conditions in the mining operation. This stability is also demonstrated by the highwalls of the old abandoned Chaffin Quarries on the property. These highwalls are nearly vertical and have stood without any failure since the early 1900's.

Additionally, Dr. Ben L. Seegmiller, a consulting mining geotechnical engineer, has examined the slopes in the Quarry and commented that slope angles of 63.4 degrees (2:1) are likely to be stable in limestone. Dr Seegmiller produced two reports on rock slope stability for this site, which are included as Appendices Nos. 15 and 16. In his detailed slope stability analysis, he collected and analyzed core drilling and logging data, performed field and laboratory strength tests, and completed detailed slope stability analyses for the slopes at the Central and Northeast Blocks. He concluded that in the Northeast Block, limestone slopes would maintain a factor of safety against rotational shear failure of at least 1.3 if they were left at 2V:1H (63.4°). He concluded that shale slopes would maintain the same factor of safety if left at 1H:1V (45°) in the S4 shale and 2H:1V (26.6°)in the S1 and S2 shales.

He also concluded that the limestone highwalls in the Central Pit South Slope would maintain a factor of safety of 1.2 to 1.3 against rotational shear failure if left at 2V:1H (63.4°) slopes provided that adequate benches and ramps are left at various levels in the pit. He recommended three 75-foot wide ramps at the 5,800-, 5,580-, and 5,400-foot elevations, and 25-foot catch benches every 60 vertical feet down the highwall.

The operator has chosen to construct the south slope of the central pit with 60-foot tall benches separated by 30-foot wide ramps with 75-foot wide ramps at the 5,800-, 5,580-, and 5,300-foot elevations. This configuration conforms to the design in the Seegmiller report, except that ramps are conservatively designed slightly wider than recommended and the location of the lowest step-out is 100 feet lower than recommended. Since the majority of the Central Reserve Block is currently excavated to 5,700 feet, observations and data can be collected for several years in order to determine whether lowering the location of the lowest step-out bench is justified. The operator will continue to monitor slope stability within the pit and will modify its design if necessary. All pit design changes will be filed with the Division.

The variance from Rule R647-4-111.7 is requested to allow the Operator to continue the same method of operation it now conducts as mining progresses from the Central reserve block into the Northeast reserve block and later into the Southwest pit expansion area. Cutting the highwall back to achieve a highwall slope of 45 degrees or less would disturb more of the shale units, all of which are not useful materials. This would result in the disturbance of additional land and create additional waste rock to be disposed.

The 63 degree highwall slopes, as previously approved by the Division, in the central area of the Quarry have maintained stable slopes and have not caused any unstable or unsafe conditions in the mining operation. The stability of steep slopes in the limestone units can be demonstrated by examining the highwalls of the old abandoned Chaffin Quarries on the property. These highwalls are nearly vertical and have stood without any failure since the early 1900's.

Additionally, Dr. Ben L. Seegmiller, a consulting mining geotechnical engineer, has examined the slopes in the Quarry and commented that slope angles of 63.4 degrees (2:1) may be stable in limestone. Dr Seegmiller produced two reports on rock slope stability for this site, which are included as Appendices Nos. 15 and 16. In his detailed slope stability analysis, he collected and analyzed core drilling and logging data, performed field and laboratory strength tests, and completed detailed slope stability analyses for the slopes at the Central and Northeast Blocks. He concluded that in the Northeast Block, limestone slopes would maintain a factor of safety against rotational shear failure of at least 1.3 if they were left at 2V:1H (63.4°). He concluded that shale slopes would maintain the same factor of safety if left at H:1V (°)

He also concluded that the limestone highwalls in the Central Pit South Slope would maintain a factor of safety of 1.2 to 1.3 against rotational shear failure if left at 2V:1H (63.4°) slopes provided that adequate benches and ramps are left at various levels in the pit. He recommended three 75-foot wide ramps at the 5,800-, 5,580-, and 5,400-foot elevations, and 25-foot catch benches every 60 vertical feet down the highwall.

The operator has chosen to construct the south slope of the central pit with 60-foot tall highwalls separated by 30-foot wide ramps. This configuration has historically proven stable for other areas of the operation, and will allow for maximum resource recovery. The operator will continue to monitor slope stability within the pit and will modify its design if necessary. He further commented that for the limestones, a maximum slope height of 840

~~vertical feet would have a safety factor, against rotational shear failure, of approximately 1.70. His conclusion was that the highwall and low wall in limestone should be quite safe concerning rotational shear. Dr. Seegmiller commented that for the highwall and low wall, which are fully within the strong limestones, the overall angle of 63.4 degrees (2:1) should be acceptable for slopes up to 840 feet high, based on available stability data.~~

~~Additional tests were recommended to confirm the initial findings. The operator plans to start these tests no later than the summer of 2002. Results from these tests will be implemented into the current pit design and changes will be made if the findings so warrant. All test results will be shared with the Division and changes to the current pit design will only be made with the Divisions approval. The report entitled "Initial Evaluation Highwall Slope Stability Hank Allen Quarry" is included in Appendix No. 15 of this NOI.~~

Rule R647-4-111.8 Roads and Pads

The variance from Rule R647-4-111.7 is requested so that the Operator and adjacent landowners may access their properties after mining operations have been completed. By removing pavement and reducing the width of the roads, their condition will be such that they will become self-reclaimed unless maintained by the landowner(s).

~~The variance from Rule R647-4-111.7 is requested to allow the Operator the means to access property it owns in fee after mining operations have been completed. The variance also allows other landowners to continue to use the North road to access their property.~~

1.14. Alternate methods or measures to be utilized.

Response:

Rule R647-4-111.7 Highwalls

The alternative to the requested variance from Rule R647-4-111.7 would be re-design the mine plan and cut the highwall back to achieve a slope of 45 degrees or less. This would result in a greater area of land being disturbed, smaller recoverable limestone reserves and a larger volume of waste rock to be disposed. It is likely that such a slope configuration would make mining operations economically and environmentally unfeasible.

Rule R647-4-111.8 Roads and Pads

The alternative to the requested variance from Rule R647-4-111.8 would be to reclaim the two short road segments. However, this would eliminate access the property by the landowner and in the case of the North road, would cut off access by other landowners to their property.

2. A variance shall be granted if the alternative method or measure proposed will be consistent with the Act.

Response:

The Operator respectfully requests the Division approve the variances requested above. The Operator believes approval of the variance requested to Rule R647-4-111.7 to be consistent with the Act as evidenced by the Division previously granting a similar variance for the current central quarry area. The Operator also believes the other variance, as requested, is be consistent with the Act.

3. **Any variance must be specifically approved by the Division in writing.**

Response:

The Operator understands that any variance must be specifically approved by the Division in writing.

R647-4-113. Surety.

113.1. After receiving notification that the notice of intention has been approved, but prior to commencement of operations, the operator shall provide the reclamation surety to the Division.

Response:

The Operator, after receiving notification from the Division that this NOI has been approved, will adjust the current surety bond that is in place.

113.2. The Division will not require a separate surety when a reclamation surety in a form and amount acceptable to the Board is held by the Division of State Lands and Forestry, or an agency of the federal government.

113.3. As part of the review of the notice of intention, the Division shall determine the required surety amount based on site specific calculations reflecting the Division's cost to reclaim the site. An operator's estimate will be accepted if it is accurate and verifiable.

Response:

The Operator has performed ~~site-specific~~ calculations based on both RSMeans construction costs and site-specific cost estimates to determine the cost to reclaim the site and determine the surety amount. These calculations are included at the end of this section of the NOI and are summarized in Table 4-113-3-1. The cost for reclamation was calculated by first preparing an inventory of all structures located in the Plant and Quarry. This inventory included the dimensions and construction type of all existing structures. The location and identification of these structures are shown on the Surface Facilities - Plant and Surface Facilities - Quarry Maps included in Appendices No. 4 and No. 5 of this NOI.

The Proposed Life-Of-Quarry Disturbance Limit was determined by overlaying the limits of the pits, as modeled by MINEX mining software on a base map created in AutoCAD Map 2000 software. The areas needed for future disturbance were compared to the Present Disturbance Limit as shown on the ~~black and white~~color photo in Appendix No. 3 of this NOI. The disturbance limit was adjusted to include all areas presently disturbed; all areas needed for future disturbance; and a reasonable buffer around the disturbance areas. The acreage included in the resulting Proposed Life-Of-Quarry Disturbance Limit Map was determined by AutoCAD Map 2000 to ~~be 669~~ increase from 669 acres to 731 acres. The acreage figure of ~~669~~ 731 acres was used in determining re-vegetation and reclamation costs.

Note that since most of the pit floor will not be revegetated, an increase in its area can reduce the acreage of reclamation revegetation. The ultimate pit will cover 230 acres, of which 114 acres would be the pit floor. As stated on Section R647-4-110.2, attempts will be made to revegetate 68 acres of the pit floor (Note that the attached surety estimate includes 30 acres of pit floor revegetation, which is the current area of the pit floor. As the pit expands into the Northeast and Southwest Blocks, additional revegetation acreage will be added to the surety estimate). The North and South Access roads and the remaining Chaffin quarries (these areas also will not be revegetated) will cover a total of 4 acres. Thus, the final area of reclamation revegetation is estimated to total 565 acres. The Proposed Life-Of-Quarry Disturbance Limit Map is included in Appendix No. 9 of this NOI.

R.S. Means Heavy Construction Cost Data, ~~13~~21st Annual Edition (~~1999~~2007) was used to estimate the demolition, haulage, disposal, and re-vegetation costs of the reclaimed lands. ~~Means CostWorks '99 interactive cost books software was used to calculate the reclamation surety estimate. A copy of this cost data was exported into an Excel spreadsheet.~~ The cost data was escalated to 2012 dollars using escalation factors supplied by the Division. A copy of this spreadsheet entitled "Surety Estimate Using ~~CostWorks 1999~~2007 Construction Cost Data - Ash Grove Cement Company - Leamington Plant and Quarry" is included at the end of this Section of the NOI.

An estimated ~~669~~731 acres is proposed to be disturbed over the life of the Quarry. The total estimated reclamation surety amount, including a 10% contingency and escalation for five (5) years at ~~3.27~~3.20 percent, is $~~4,372,057~~ 6,766,000. This puts the average cost per disturbed acre at $~~6,535.21~~ 9,255.

113.4. The operator shall submit a completed Reclamation Contract (FORM MR.-RC) with the required surety. The form and amount of the surety must be approved by the Board. Acceptable forms may include:

4.11. Corporate surety bond;

4.12. Federally-insured certificate of deposit payable to the State of Utah, Division of Oil, Gas and Mining;

4.13. Cash;

4.14. An irrevocable letter of credit issued by a bank organized to do business in the United States;

4.15. Escrow accounts.

4.16. In addition, the Board may accept a written self-bonding agreement in the case of operators showing sufficient financial strength.

Response:

A completed Reclamation Contract (FORM MR-RC) will be submitted by the Operator in the amount stated upon approval by the Division of the surety estimate. A copy of the Division's Form MR-RC (revised January 7, 1999) is included at the end of this section of the NOI.

113.5. Surety shall be required until such time as reclamation is deemed complete by the Division. The Division shall promptly conduct an inspection when notified by the operator that reclamation is complete. The full release of surety shall be evidence that the operator has reclaimed as required by the Act.

113.6. Adjustments or revisions made in the surety amount shall be in accordance with the terms and conditions outlined in the Reclamation Contract.

Table 4-113-3-1	
ASH GROVE CEMENT COMPANY - LEAMINGTON QUARRY, UTAH SURETY SUMMARY	
Reclamation Activities	
Cleanup, Removal, Demolition and/or Burial of Facilities and Structures	$ 1,074,985.71
Removal and Disposal of Hazardous Materials	$ 15,367.67
Backfilling, Grading and Contouring	$ 271,133.96
Ripping Pit Floors, Access Roads, and Slopes	$ 2,602,606.88
Drainage Reconstruction	$ 123,401.00
Mulching and Revegetation	$ 709,621.25
General Site Cleanup	$ 8,772.00
SUBTOTAL	$ 4,805,888.46
Administrative Costs	
Contigency (10%)	$ 480,588.85
Reclamation Supervision (10%)	$ 480,588.85
Mob/Demob	$ 12,810.00
Escalation (Assume 3.2% apr)	$ 985,890.56
TOTAL	**$ 6,765,766.72**

For more detail, refer to the table titled: Surety Estimate Using 2007 Construction Cost Data - Ash Grove Cement Co. - Leamington Plant & Quarry

Surety Estimate Using 2007 Construction Cost Data - Ash Grove Cement Co. - Leamington Plant & Quarr

Revised: June 9, 2008 **Permit No. M/023/004** Costs from 2007 RSMeans Heavy Construction Cost Data, 21st ed unless otherwise noted

1-6 Truck Silos Demolition

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
37,800	0241 1615 0100	0.10	0.13	0.06	0.29	10,962.00	Explosive/implosive dml, no disposal, conc bldg	C.F.	
1,400	3123 1642 1650	0.29	0.51	0.19	0.99	1,386.00	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1,093	3123 2318 1220	1.07	2.06	0.79	3.92	4,284.56	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
31	See Note 1	-	-	-	60.75	1,883.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
522	See Note 1	-	-	-	60.75	31,711.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
522	3123 2318 1220	1.07	2.06	0.79	3.92	2,046.24	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
522	3123 1642 1650	0.29	0.51	0.19	0.99	516.78	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
50	3123 2314 4020	0.19	0.45	0.14	0.78	39.00	Backfill, structural, 200 H.P., 50' haul, common earth	C.Y.	
						52,829.33	Totals		

7 Large Truck Silo Demolition

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
17,880	0241 1615 0100	0.10	0.13	0.06	0.29	5,185.20	Explosive/implosive dml, no disposal, conc bldg	C.F.	
183	See Note 1	-	-	-	60.75	11,117.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
845	3123 1642 1650	0.29	0.51	0.19	0.99	836.55	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
845	3123 2318 1220	1.07	2.06	0.79	3.92	3,312.40	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						20,451.40	Totals		

8 Conveyor Demolition

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
497	0241 1927 0020	0.20	0.64	0.37	1.21	601.37	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
3,247	0241 1615 0020	0.10	0.13	0.06	0.29	941.63	Explosive/implosive dml, no disposal, steel bldg	C.F.	
3,364	0241 1927 0020	0.20	0.64	0.37	1.21	4,070.44	Steel cutting, torch cutting, 1" thick	L.F.	
5	0154 3340 6100		4.60		4.60	23.00	Cutting conveyor belt with circular saw	S/day	
1,018	3123 1642 1601	0.38	0.31	0.22	0.91	926.38	Excavating, bulk bank measure, FE loader, whl mtd, 3 CY cap	C.Y.	
20	0241 1919 0100		90.00		90.00	1,800.00	Dump charges, typical urban city, fees only, bldg constr materi	Ton	
53	3123 2318 1130	4.38	8.20	3.22	15.80	837.40	Hauling, LCY, no loading, 16.5 c.y dump trailer, 20 mi RT, .4 hr	C.Y.	
66	3123 2318 4700	-	1.20	0.12	1.32	87.12	Highway hauling beyond 20 miles, per loaded mile, minimum	Mile	
						9,287.34	Totals		

9 Bath House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
33,600	0241 1615 0100	0.10	0.13	0.06	0.29	9,744.00	Explosive/implosive dml, no disposal, conc bldg	C.F.	
467	0241 1317 5300	6.55	4.50	3.95	15.00	7,005.00	Site dml, conc to 6" thick, rod reinforced	S.Y.	
218	3123 1642 1650	0.29	0.51	0.19	0.99	215.82	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
218	3123 2318 1220	1.07	2.06	0.79	3.92	854.56	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
4,200	0241 1921 1000	2.69	1.51	1.65	5.85	24,570.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						42,389.38	Totals		

10 Administration Office

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
46,400	0241 1615 0100	0.10	0.13	0.06	0.29	13,456.00	Explosive/implosive dml, no disposal, conc bldg	C.F.	
644	0241 1317 5300	6.55	4.50	3.95	15.00	9,660.00	Site dml, conc to 6" thick, rod reinforced	S.Y.	
287	3123 1642 1650	0.29	0.51	0.19	0.99	284.13	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
287	3123 2318 1220	1.07	2.06	0.79	3.92	1,125.04	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
5,800	0241 1921 1000	2.69	1.51	1.65	5.85	33,930.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						58,455.17	Totals		

11 Cafeteria

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
395	0241 1317 5300	6.55	4.50	3.95	15.00	5,925.00	Site dml, conc to 6" thick, rod reinforced	S.Y.	
3,552	0241 1921 1000	2.69	1.51	1.65	5.85	20,779.20	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
28,416	0241 1613 0050	0.13	0.17	0.10	0.40	11,366.40	Build dml, urban, 20 mi haul, no dump fee/tnd, concrete	C.F.	
66	3123 1642 1650	0.29	0.51	0.19	0.99	65.34	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
66	3123 2318 1220	1.07	2.06	0.79	3.92	258.72	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						38,394.66	Totals		

12 - 13 Field Tile & Septic Tanks

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
175	3123 1613 0500	2.44	2.30	1.51	6.25	1,093.75	Excavate trench, concrete curb, 6'-10' deep, 3/4 CY hyd backh	C.Y.	
24	3123 1642 1650	0.29	0.51	0.19	0.99	23.76	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
24	3123 2318 1220	1.07	2.06	0.79	3.92	94.08	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
555	3123 2314 4020	0.19	0.45	0.14	0.78	432.90	Backfill, structural, 200 H.P., 50' haul, common earth	C.Y.	
5	0154 3340 6100		4.60		4.60	23.00	Cutting PVC septic lines with a circular saw	$/day	
2	0241 1919 0100		90.00	-	90.00	180.00	Dump charges, typical urban city, fees only, bldg constr materi	Ton	
12	3123 1642 1650	0.29	0.51	0.19	0.99	11.88	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
12	3123 2318 0580	6.05	13.60	4.90	24.55	294.60	Hauling, LCY, no loading, 12 c.y dump truck, 20 MI RT, 0.4 lds	C.Y.	
24	3123 2318 4700	-	1.20	0.12	1.32	31.68	Highway hauling beyond 20 miles, per loaded mile, minimum	Mile	
						2,185.65	Totals		

14 Man Tunnel

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
320	3123 2314 4020	0.19	0.45	0.14	0.78	249.60	Backfill, structural, 200 H.P., 50' haul, common earth	C.Y.	
7,100	0241 1615 0100	0.10	0.13	0.06	0.29	2,059.00	Explosive/implosive dml, no disposal, conc bldg	C.F.	
						2,308.60	Totals		

15 Break Room/Restroom

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
6,000	0241 1615 0100	0.10	0.13	0.06	0.29	1,740.00	Explosive/implosive dml, no disposal, conc bldg	C.F.	
44	0241 1317 5300	6.55	4.50	3.95	15.00	660.00	Site dml, conc to 6" thick, rod reinforced	S.Y.	
62	3123 1642 1650	0.29	0.51	0.19	0.99	61.38	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
62	3123 2318 1220	1.07	2.06	0.79	3.92	243.04	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
400	0241 1921 1000	2.69	1.51	1.65	5.85	2,340.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						5,044.42	Totals		

16 Switch Gear #1

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
295	0241 1927 0020	0.20	0.64	0.37	1.21	356.95	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
102	3123 1642 1650	0.29	0.51	0.19	0.99	100.98	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
102	3123 2318 0030	1.48	2.30	1.03	4.81	490.62	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
1,638	0241 1921 1000	2.69	1.51	1.65	5.85	9,582.30	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						10,530.85	Totals		

17 Electric Sub Station

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
612	0241 1360 1700	1.70	0.55	0.96	3.21	1,964.52	Site dml, chain link, posts & fabric, 8' to 10' high	L.F.	
6	2605 0510 1570	785.00	149.00	#####	1,350.00	8,100.00	Electrical demo, transformer, 3 phase to 600v, primary, 750 kV	Ea.	
4	0281 2010 3110	-	118.80	13.20	132.00	528.00	Hazardous W cln/pu/dspl, liq pickup, vac trk,min charge,4hr,1(	Hr.	
0	0281 2010 6020	-	435.60	48.40	484.00	121.00	Hazardous W cln/pu/dspl, dumpsite disposal charge, max	Ton	
162	0241 1927 0020	0.20	0.64	0.37	1.21	196.02	Torch cutting steel, 1" thick plate	L.F.	
336	See Note 1	-	-	-	60.75	20,412.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
341	3123 1642 1650	0.29	0.51	0.19	0.99	337.59	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
5	3123 2318 0030	1.48	2.30	1.03	4.81	24.05	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
336	3123 2318 1220	1.07	2.06	0.79	3.92	1,317.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						33,000.30	Totals		

18 - 21 Waste Oil, Gasoline, #2 Diesel, & #1 Diesel Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2	0265 1030 0120	410.00	259.00	#####	915.00	1,830.00	Removal of ugnd stor tk, 6000gal to 8000gal tank	Ea.	
100	0265 1030 0390	-	5.15	0.57	5.72	572.00	Removal of ugnd stor tk, dispose of sludge off-site, avg	Gal.	
2	0265 1030 1020	-	780.00	78.00	858.00	1,716.00	Removal of ugnd stor tk, haul to certified salv dump, 6000gal-8	Ea.	
4	0265 1030 1025	-	1,050.00	#####	1,155.00	4,620.00	Removal of ugnd stor tk, 9000gal to 12,000gal tank	Ea.	
200	0265 1030 0390	-	5.15	0.57	5.72	1,144.00	Removal of ugnd stor tk, dispose of sludge off-site, avg	Gal.	
4	0265 1030 1025	-	1,050.00	#####	1,155.00	4,620.00	Removal of ugnd stor tk, haul to certified salv dump, 9000gal-1	Ea.	
120	See Note 1	-	-	-	60.75	7,290.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
120	3123 1642 1650	0.29	0.51	0.19	0.99	118.80	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
120	3123 2318 1220	1.07	2.06	0.79	3.92	470.40	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						22,381.20	Totals		

22 Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,120	0241 1927 002C	0.20	0.64	0.37	1.21	1,355.20	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
226	See Note 1	-	-	-	60.75	13,729.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
369	3123 1642 165C	0.29	0.51	0.19	0.99	365.31	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
226	3123 2318 122C	1.07	2.06	0.79	3.92	885.92	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
143	3123 2318 003C	1.48	2.30	1.03	4.81	687.83	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						17,023.76	Totals		

23 Mobil Equipment

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
488	0241 1927 002C	0.20	0.64	0.37	1.21	590.48	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
84	See Note 1	-	-	-	60.75	5,103.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
231	3123 1642 165C	0.29	0.51	0.19	0.99	228.69	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
84	3123 2318 122C	1.07	2.06	0.79	3.92	329.28	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
147	3123 2318 003C	1.48	2.30	1.03	4.81	707.07	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
3,000	0241 1921 100C	2.69	1.51	1.65	5.85	17,550.00	Gutting, building interior, including disposal, commercial bldg	SF Flr	
						24,508.52	Totals		

24 Waste Oil Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1	0265 1030 030C	59.00	133.00	43.00	235.00	235.00	Removal of ugnd stor tk, 3000gal to 5000gal tank	Ea.	
50	0265 1030 039C	-	5.15	0.57	5.72	286.00	Removal of ugnd stor tk, dispose of sludge off-site, avg	Gal.	
1	0265 1030 102S	-	660.00	66.00	726.00	726.00	Removal of ugnd stor tk, haul to certified salv dump, 3000gal-5	Ea.	
6	See Note 1	-	-	-	60.75	340.20	Site dml, conc, 7" to 24" thick, plain	C.Y.	
6	3123 1642 165C	0.29	0.51	0.19	0.99	5.54	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
6	3123 2318 122C	1.07	2.06	0.79	3.92	21.95	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						1,614.70	Totals		

25 Lube Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
235	0241 1927 002C	0.20	0.64	0.37	1.21	284.35	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
54	3123 1642 165C	0.29	0.51	0.19	0.99	53.46	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
54	3123 2318 003C	1.48	2.30	1.03	4.81	259.74	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
11	See Note 1	-	-	-	60.75	668.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
11	3123 1642 165C	0.29	0.51	0.19	0.99	10.89	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
11	3123 2318 122C	1.07	2.06	0.79	3.92	43.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						1,319.81	Totals		

26 Conveyor

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
113	0241 1927 002C	0.20	0.64	0.37	1.21	136.73	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
131	0241 1615 002C	0.10	0.13	0.06	0.29	37.99	Explosive/implosive dml, no disposal, steel bldg	C.F.	
480	0241 1927 002C	0.20	0.64	0.37	1.21	580.80	Steel cutting, torch cutting, 1" thick	L.F.	
175	3123 1642 160I	0.38	0.31	0.22	0.91	159.25	Excavating, bulk bank measure, FE loader, whl mtd, 3 CY cap	C.Y.	
5	0154 3340 610C		4.60		4.60	23.00	Cutting up conveyor belt with circular saw	S/day	
12	0241 1919 010C		90.00	-	90.00	1,080.00	Dump charges, typical urban city, fees only, bldg constr materi	Ton	
53	3123 2318 113C	4.38	8.20	3.22	15.80	837.40	Hauling, LCY, no loading, 16.5 c.y dump trailer, 20 mi RT, .4 k	C.Y.	
86	3123 2318 470C	-	1.20	0.12	1.32	87.12	Highway hauling beyond 20 miles, per loaded mile, minimum	Mile	
175	3123 2318 003C	1.48	2.30	1.03	4.81	841.75	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						3,784.04	Totals		

27 Raw Materials Truck Dump

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
143	See Note 1	-	-	-	60.75	8,656.88	Site dml, conc, 7" to 24" thick, plain	C.Y.	
308	3123 2317 019C	0.70	2.17	0.59	3.46	1,065.68	Fill, spread fill, with dozer 300 h.p 300' haul	C.Y.	
						9,722.56	Totals		

28 Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
50	0241 1927 002C	0.20	0.64	0.37	1.21	60.50	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
4	See Note 1	-	-	-	60.75	212.63	Site dml, conc, 7" to 24" thick, plain	C.Y.	
21	3123 1642 165C	0.29	0.51	0.19	0.99	20.30	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
17	3123 2318 003C	1.48	2.30	1.03	4.81	81.77	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						375.19			

29 Raw Materials Silos (Qty 5)

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4,508	0241 1615 010C	0.10	0.13	0.06	0.29	1,307.32	Explosive/implosive dml, no disposal, conc bldg	C.F.	
167	3123 1642 165C	0.29	0.51	0.19	0.99	165.33	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
167	3123 2318 122C	1.07	2.06	0.79	3.92	654.64	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
111	See Note 1	-	-	-	60.75	6,743.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
111	3123 2318 122C	1.07	2.06	0.79	3.92	435.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
111	3123 1642 165C	0.29	0.51	0.19	0.99	109.89	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
74	0241 1927 002C	0.20	0.64	0.37	1.21	89.54	Steel cutting, torch cutting, 1" thick	L.F.	
1	3123 1642 165C	0.29	0.51	0.19	0.99	1.29	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1	3123 2318 003C	1.48	2.30	1.03	4.81	6.25	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
						9,512.63	Totals		

30 Warehouse

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
975	0241 1927 002C	0.20	0.64	0.37	1.21	1,179.75	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
153	See Note 1	-	-	-	60.75	9,294.75	Site dml, conc, 7" to 24" thick, plain	C.Y.	
403	3123 1642 165C	0.29	0.51	0.19	0.99	398.97	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
153	3123 2318 122C	1.07	2.06	0.79	3.92	599.76	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
250	3123 2318 003C	1.48	2.30	1.03	4.81	1,202.50	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
5,840	0241 1921 100C	2.69	1.51	1.65	5.85	34,164.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						45,839.73	Totals		

31 Maintenance Shop

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
925	0241 1927 002C	0.20	0.64	0.37	1.21	1,119.25	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
135	See Note 1	-	-	-	60.75	8,201.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
360	3123 1642 165C	0.29	0.51	0.19	0.99	356.40	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
135	3123 2318 122C	1.07	2.06	0.79	3.92	529.20	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
225	3123 2318 003C	1.48	2.30	1.03	4.81	1,082.25	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
5,110	0241 1921 100C	2.69	1.51	1.65	5.85	29,893.50	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						41,181.85			

32 Bag House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4,596	0241 1927 002C	0.20	0.64	0.37	1.21	5,561.16	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
962	3123 1642 165C	0.29	0.51	0.19	0.99	952.38	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
962	3123 2318 003C	1.48	2.30	1.03	4.81	4,627.22	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
						11,140.76	Totals		

33 Water Tank

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
629	0241 1927 002C	0.20	0.64	0.37	1.21	761.09	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
14	3123 1642 165C	0.29	0.51	0.19	0.99	13.46	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
14	3123 2318 010C	2.36	3.68	1.66	7.70	104.72	Hauling, LCY, no loading, 6 c.y dump truck, 2 MI RT, 2.6 lds/h	C.Y.	
189	3123 1613 005C	3.58	1.62	2.05	7.25	1,370.25	Excavate trench, cont ftg, no shl/dewtrg, 1-4'D,3/8 CY tractor l	C.Y.	
						2,249.52	Totals		

34 Supply Storage Yard

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
396	See Note 1	-	-	-	60.75	24,057.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
396	3123 2318 122C	1.07	2.06	0.79	3.92	1,552.32	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
547	3123 1642 165C	0.29	0.51	0.19	0.99	541.53	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1,100	3123 2314 402C	0.19	0.45	0.14	0.78	858.00	Backfill, structural, 200 H.P., 50' haul, common earth	C.Y.	
1,689	0241 1317 505C	3.11	2.14	1.90	7.15	12,076.35	Site demo, no hauling, pavement removal, bit, 4" to 6" thick	S.Y.	
151	3123 2318 115C	0.73	1.40	0.53	2.66	401.66	Hauling, LCY, no loading, 20 c.y dump trailer, 1 MI RT, 2.5 lds	C.Y.	
1,038	3123 1632 170C	0.78	2.55	0.67	4.00	4,152.00	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						43,638.86			

35 Diesel Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
65	See Note 1	-	-	-	60.75	3,948.75	Site dml, conc, 7" to 24" thick, plain	C.Y.	
65	3123 1642 1650	0.29	0.51	0.19	0.99	64.35	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
65	3123 2318 1220	1.07	2.06	0.79	3.92	254.80	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
2	0265 1030 1025	-	1,050.00	#####	1,155.00	2,310.00	Removal of ugnd stor tk, 9000gal to 12,000gal tank	Ea.	
100	0265 1030 0390	-	5.15	0.57	5.72	572.00	Removal of ugnd stor tk, dispose of sludge off-site, avg	Gal.	
2	0265 1030 1025	-	1,050.00	#####	1,155.00	2,310.00	Removal of ugnd stor tk, haul to certified salv dump, 9000gal	Ea.	
						9,459.90	Totals		

36 Storage Buildings

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
114	0241 1927 0020	0.20	0.64	0.37	1.21	137.94	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
58	3123 1642 1650	0.29	0.51	0.19	0.99	57.42	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
58	3123 2318 0030	1.48	2.30	1.03	4.81	278.98	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						474.34	Totals		

37 - 38 Blend Silos

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
25,758	0241 1615 0100	0.10	0.13	0.06	0.29	7,469.82	Explosive/implosive dml, no disposal, conc bldg	C.F.	
954	3123 1642 1650	0.29	0.51	0.19	0.99	944.46	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
954	3123 2318 1220	1.07	2.06	0.79	3.92	3,739.68	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						12,153.96	Totals		

39 Lube & Hyd. Oil Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
142	0241 1927 0020	0.20	0.64	0.37	1.21	171.82	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
41	3123 1642 1650	0.29	0.51	0.19	0.99	40.59	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
41	3123 2318 0030	1.48	2.30	1.03	4.81	197.21	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						409.62	Totals		

40 Raw Mill

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,714	0241 1927 0020	0.20	0.64	0.37	1.21	2,073.94	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
574	3123 1642 1650	0.29	0.51	0.19	0.99	568.26	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
339	3123 2318 0030	1.48	2.30	1.03	4.81	1,630.59	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
235	3123 2318 1220	1.07	2.06	0.79	3.92	921.20	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
235	See Note 1	-	-	-	60.75	14,276.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
						19,470.24	Totals		

41 Switch Gear #4

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2,916	0241 1615 0100	0.10	0.13	0.06	0.29	845.64	Explosive/implosive dml, no disposal, conc bldg	C.F.	
108	3123 1642 1650	0.29	0.51	0.19	0.99	106.92	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
108	3123 2318 1220	1.07	2.06	0.79	3.92	423.36	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
2,520	0241 1921 1000	2.69	1.51	1.65	5.85	14,742.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						16,117.92	Totals		

42 Finish Mill

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
5,580	0241 1927 0020	0.20	0.64	0.37	1.21	6,751.80	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
1,250	3123 1642 1650	0.29	0.51	0.19	0.99	1,237.50	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1,091	3123 2318 0030	1.48	2.30	1.03	4.81	5,247.71	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
159	See Note 1	-	-	-	60.75	9,659.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
159	3123 2318 1220	1.07	2.06	0.79	3.92	623.28	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						23,519.54	Totals		

43 Preheat Tower

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
7,877	0241 1927 0020	0.20	0.64	0.37	1.21	9,531.17	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
2,327	3123 1642 1650	0.29	0.51	0.19	0.99	2,303.73	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
2,327	3123 2318 0030	1.48	2.30	1.03	4.81	11,192.87	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						23,027.77	Totals		

44 Alkali Bag House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,087	0241 1927 0020	0.20	0.64	0.37	1.21	1,315.27	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
129	3123 1642 1650	0.29	0.51	0.19	0.99	127.71	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
129	3123 2318 0030	1.48	2.30	1.03	4.81	620.49	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						2,063.47	Totals		

45 Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
648	0241 1615 0100	0.10	0.13	0.06	0.29	187.92	Explosive/implosive dml, no disposal, conc bldg	C.F.	
30	3123 1642 1650	0.29	0.51	0.19	0.99	29.70	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
30	3123 2318 1220	1.07	2.06	0.79	3.92	117.60	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
6	See Note 1	-	-	-	60.75	364.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
						699.72	Totals		

46 Pipeline

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3	0241 1927 0020	0.20	0.64	0.37	1.21	3.63	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
1	See Note 1	-	-	-	60.75	72.90	Site dml, conc, 7" to 24" thick, plain	C.Y.	
2	3123 1642 1650	0.29	0.51	0.19	0.99	2.18	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1	3123 2318 1220	1.07	2.06	0.79	3.92	4.70	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
1	3123 2318 0030	1.48	2.30	1.03	4.81	4.81	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						88.22	Totals		

47 Stack

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
301	0241 1927 0020	0.20	0.64	0.37	1.21	364.21	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
7	3123 1642 1650	0.29	0.51	0.19	0.99	6.93	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
7	3123 2318 0030	1.48	2.30	1.03	4.81	33.67	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						404.81	Totals		

48 Coal Silo

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
11,583	0241 1615 0100	0.10	0.13	0.06	0.29	3,359.07	Explosive/implosive dml, no disposal, conc bldg	C.F.	
35	See Note 1	-	-	-	60.75	2,126.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
464	3123 1642 1650	0.29	0.51	0.19	0.99	459.36	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
464	3123 2318 1220	1.07	2.06	0.79	3.92	1,818.88	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						7,763.56	Totals		

49 Kiln Scanner Building

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
24	0241 1927 0020	0.20	0.64	0.37	1.21	29.04	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
10	3123 1642 1650	0.29	0.51	0.19	0.99	9.41	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
10	3123 2318 0030	1.48	2.30	1.03	4.81	45.70	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						84.14	Totals		

50 Coal Truck Dump

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
250	See Note 1	-	-	-	60.75	15,187.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
						15,187.50	Totals		

51 Control Room & Lab

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,111	0241 1317 5300	6.55	4.50	3.95	15.00	16,665.00	Site dml, conc to 6" thick, rod reinforced	S.Y.	
10,000	0241 1921 1000	2.69	1.51	1.65	5.85	58,500.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
531	3123 1642 1650	0.29	0.51	0.19	0.99	525.69	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
531	3123 2318 1220	1.07	2.06	0.79	3.92	2,081.52	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
9,342	0241 1615 0100	0.10	0.13	0.06	0.29	2,709.18	Explosive/implosive dml, no disposal, conc bldg	C.F.	
						80,481.39	Totals		

52 Switch Gear #7

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,863	0241 1615 0100	0.10	0.13	0.06	0.29	540.27	Explosive/implosive dml, no disposal, conc bldg	C.F.	
67	See Note 1	-	-	-	60.75	4,070.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
136	3123 1642 1650	0.29	0.51	0.19	0.99	134.64	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
136	3123 2318 1220	1.07	2.06	0.79	3.92	533.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
1,200	0241 1921 1000	2.69	1.51	1.65	5.85	7,020.00	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						12,298.28	Totals		

53 Burner Floor

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,863	0241 1615 0100	0.10	0.13	0.06	0.29	540.27	Explosive/implosive dml, no disposal, conc bldg	C.F.	
67	See Note 1	-	-	-	60.75	4,070.25	Site dml, conc, 7" to 24" thick, plain	C.Y.	
136	3123 1642 1650	0.29	0.51	0.19	0.99	134.64	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
136	3123 2318 1220	1.07	2.06	0.79	3.92	533.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						5,278.28	Totals		

54 Heat Exchanger

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,292	0241 1927 0020	0.20	0.64	0.37	1.21	1,563.32	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
231	3123 1642 1650	0.29	0.51	0.19	0.99	228.69	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
231	3123 2318 0030	1.48	2.30	1.03	4.81	1,111.11	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						2,903.12	Totals		

55 Bag House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,423	0241 1927 0020	0.20	0.64	0.37	1.21	1,721.83	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
179	3123 1642 1650	0.29	0.51	0.19	0.99	177.21	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
179	3123 2318 0030	1.48	2.30	1.03	4.81	860.99	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						2,760.03	Totals		

56 Power Wash Room

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	0241 1927 0020	0.20	0.64	0.37	1.21	4.84	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
8	See Note 1	-	-	-	60.75	455.63	Site dml, conc, 7" to 24" thick, plain	C.Y.	
12	3123 1642 1650	0.29	0.51	0.19	0.99	11.88	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
8	3123 2318 1220	1.07	2.06	0.79	3.92	29.40	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
5	3123 2318 0030	1.48	2.30	1.03	4.81	21.65	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						523.39	Totals		

57 Water Treatment (Glyco Cooler)

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
265	0241 1927 0020	0.20	0.64	0.37	1.21	320.65	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
16	See Note 1	-	-	-	60.75	972.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
57	3123 1642 1650	0.29	0.51	0.19	0.99	56.43	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
16	3123 2318 1220	1.07	2.06	0.79	3.92	62.72	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
41	3123 2318 0030	1.48	2.30	1.03	4.81	197.21	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						1,609.01	Totals		

58 Gypsum Silo

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,996	0241 1615 0100	0.10	0.13	0.06	0.29	1,158.84	Explosive/implosive dml, no disposal, conc bldg	C.F.	
148	3123 1642 1650	0.29	0.51	0.19	0.99	146.52	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
148	3123 2318 1220	1.07	2.06	0.79	3.92	580.16	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						1,885.52	Totals		

59 - 60 Clinker Silos

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,455	0241 1927 0020	0.20	0.64	0.37	1.21	1,760.55	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
76	3123 2318 0030	1.48	2.30	1.03	4.81	365.56	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
2,160	3123 1642 1650	0.29	0.51	0.19	0.99	2,138.40	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
2,084	3123 2318 1220	1.07	2.06	0.79	3.92	8,169.28	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
56,268	0241 1615 0100	0.10	0.13	0.06	0.29	16,317.72	Explosive/implosive dml, no disposal, conc bldg	C.F.	
						28,751.51	Totals		

61 Truck Scale

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
72	0241 1927 0020	0.20	0.64	0.37	1.21	87.12	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
134	See Note 1	-	-	-	60.75	8,140.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
4	3123 1642 1650	0.29	0.51	0.19	0.99	3.96	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
4	3123 2318 0030	1.48	2.30	1.03	4.81	19.24	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						8,250.82	Totals		

62 Scale House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2	0241 1927 0020	0.20	0.64	0.37	1.21	2.42	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
1	See Note 1	-	-	-	60.75	30.38	Site dml, conc, 7" to 24" thick, plain	C.Y.	
1	3123 1642 1650	0.29	0.51	0.19	0.99	1.09	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1	3123 2318 0030	1.48	2.30	1.03	4.81	2.89	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						36.77	Totals		

63 Clinker Storage

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,227	3123 1632 1700	0.78	2.55	0.67	4.00	12,908.00	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						12,908.00	Totals		

64 Water Supply Well

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	0241 1927 0020	0.20	0.64	0.37	1.21	4.84	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
8	See Note 1	-	-	-	60.75	455.63	Site dml, conc, 7" to 24" thick, plain	C.Y.	
12	3123 1642 1650	0.29	0.51	0.19	0.99	11.88	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
8	3123 2318 1220	1.07	2.06	0.79	3.92	29.40	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
5	3123 2318 0030	1.48	2.30	1.03	4.81	21.65	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						523.39	Totals		

65 First Aid Room

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,917	0241 1615 0100	0.10	0.13	0.06	0.29	555.93	Explosive/implosive dml, no disposal, conc bldg	C.F.	
71	3123 1642 1650	0.29	0.51	0.19	0.99	70.29	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
71	3123 2318 1220	1.07	2.06	0.79	3.92	278.32	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
1,470	0241 1921 1000	2.69	1.51	1.65	5.85	8,599.50	Cutting, building interior, including disposal, commercial bldg.	SF Flr.	
						9,504.04	Totals		

66 Instrument Shop

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
810	0241 1615 0100	0.10	0.13	0.06	0.29	234.90	Explosive/implosive dml, no disposal, conc bldg	C.F.	
30	3123 1642 1650	0.29	0.51	0.19	0.99	29.70	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
30	3123 2318 1220	1.07	2.06	0.79	3.92	117.60	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						382.20	Totals		

67 Stack

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
694	0241 1927 0020	0.20	0.64	0.37	1.21	839.74	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
15	3123 1642 1650	0.29	0.51	0.19	0.99	15.05	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
15	3123 2318 0030	1.48	2.30	1.03	4.81	73.11	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						927.90	Totals		

68 Stack

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
301	0241 1927 0020	0.20	0.64	0.37	1.21	364.21	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
7	3123 1642 1650	0.29	0.51	0.19	0.99	6.93	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
7	3123 2318 0030	1.48	2.30	1.03	4.81	33.67	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						404.81	Totals		

69 Kiln

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
991	0241 1927 0020	0.20	0.64	0.37	1.21	1,199.11	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
92	3123 1642 1650	0.29	0.51	0.19	0.99	91.08	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
92	3123 2318 0030	1.48	2.30	1.03	4.81	442.52	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						1,732.71	Totals		

70 Off-Spec Clinker Silo

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
613	0241 1927 0020	0.20	0.64	0.37	1.21	741.73	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
358	3123 1642 1650	0.29	0.51	0.19	0.99	354.42	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
342	3123 2318 1220	1.07	2.06	0.79	3.92	1,340.64	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
16	3123 2318 0030	1.48	2.30	1.03	4.81	76.96	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						2,513.75	Totals		

71 Clinker Elevator

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
334	0241 1927 0020	0.20	0.64	0.37	1.21	404.14	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
47	3123 1642 1650	0.29	0.51	0.19	0.99	46.53	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
47	3123 2318 0030	1.48	2.30	1.03	4.81	226.07	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
						676.74	Totals		

72 Glycol Dist. Building

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,080	0241 1615 0100	0.10	0.13	0.06	0.29	313.20	Explosive/implosive dml, no disposal, conc bldg	C.F.	
71	3123 1642 1650	0.29	0.51	0.19	0.99	70.29	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
56	3123 2318 1220	1.07	2.06	0.79	3.92	219.52	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
16	See Note 1	-	-	-	60.75	972.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
150	0241 1927 0020	0.20	0.64	0.37	1.21	181.50	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
15	3123 2318 0030	1.48	2.30	1.03	4.81	72.15	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
2	3123 2318 0560	6.05	13.60	4.90	24.55	49.10	Hauling, LCY, no loading, 12 c.y dump truck, 20 MI RT, 0.4 lds	C.Y.	
						1,877.76	Totals		

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73 Tunnel Clinker Silos

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
336	See Note 1	-	-	-	60.75	20,436.30	Site dml, conc, 7" to 24" thick, plain	C.Y.	
1,113	3123 2314 400C	0.17	40.00	0.12	40.29	44,842.77	Backfill, structural, 200 H.P., 50' haul, sand & gravel	C.Y.	
						65,279.07	Totals		

74 Clinker Conveyor

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
883	0241 1927 002C	0.20	0.64	0.37	1.21	1,068.43	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
43	3123 1642 165C	0.29	0.51	0.19	0.99	42.27	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
43	3123 2318 003C	1.48	2.30	1.03	4.81	205.39	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
						1,316.09	Totals		

75 Bridge Over Canal

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,350	0241 1617 260C	9.19	1.42	5.18	15.79	21,316.50	demo concrete, plain, 8" thick, avg reinforcing	S.F.	
60	0241 1374 070C	4.72	3.30	3.13	11.15	669.00	demo cast in place pile, 14"-18" end bearing	L.F.	
60	020714140C	15.95	3.26		19.21	1,152.60	Framing demo, concrete, average reinforcing, girders, 14" x 1ft	L.F.	
36	3123 2318 122C	1.07	2.06	0.79	3.92	141.12	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
36	3123 1642 165C	0.29	0.51	0.19	0.99	35.64	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
6	3123 1642 165C	0.29	0.51	0.19	0.99	5.94	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
						23,320.80	Totals		

76 Process Duct

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2,267	0241 1927 002C	0.20	0.64	0.37	1.21	2,743.07	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
252	3123 1642 165C	0.29	0.51	0.19	0.99	249.48	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
252	3123 2318 003C	1.48	2.30	1.03	4.81	1,212.12	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
						4,204.67	Totals		

77 Cement Dist. Point To Silos

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
883	0241 1927 002C	0.20	0.64	0.37	1.21	1,068.43	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
43	3123 1642 165C	0.29	0.51	0.19	0.99	42.27	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
43	3123 2318 003C	1.48	2.30	1.03	4.81	205.39	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds.	C.Y.	
						1,316.09	Totals		

100 Switch Gear #2

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,016	0241 1615 010C	0.10	0.13	0.06	0.29	294.64	Explosive/implosive dml, no disposal, conc bldg	C.F.	
13	See Note 1	-	-	-	60.75	789.75	Site dml, conc, 7" to 24" thick, plain	C.Y.	
51	3123 1642 165C	0.29	0.51	0.19	0.99	50.49	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
51	3123 2318 213C	0.17	1.28	0.22	1.67	85.17	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
432	0241 1921 100C	2.69	1.51	1.65	5.85	2,527.20	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						3,747.25	Totals		

101 Crusher

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
209	0241 1927 002C	0.20	0.64	0.37	1.21	252.89	Steel cutting, torch cutting, 1" thick	L.F.	
42,012	0241 1615 010C	0.10	0.13	0.06	0.29	12,183.48	Explosive/implosive dml, no disposal, conc bldg	C.F.	
1,568	3123 1642 165C	0.29	0.51	0.19	0.99	1,552.32	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1	0154 3360 276C		3,027.00	-	3,027.00	3,027.00	150 ton cap., truck mounted crane	S/day	
12	3123 2318 122C	1.07	2.06	0.79	3.92	47.04	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
1,556	3123 2318 213C	0.17	1.28	0.22	1.67	2,598.52	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
						19,661.25	Totals		

102 Lunch Room

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
918	0241 1615 010C	0.10	0.13	0.06	0.29	266.22	Explosive/implosive dml, no disposal, conc bldg	C.F.	
14	See Note 1	-	-	-	60.75	850.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
48	3123 1642 165C	0.29	0.51	0.19	0.99	47.52	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
48	3123 2318 213C	0.17	1.28	0.22	1.67	80.16	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
441	0241 1921 100C	2.69	1.51	1.65	5.85	2,579.85	Gutting, building interior, including disposal, commercial bldg.	SF Flr.	
						3,824.25	Totals		

103 Pump House

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2	0241 1927 002C	0.20	0.64	0.37	1.21	2.42	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
4	3123 1642 165C	0.29	0.51	0.19	0.99	3.96	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
2	See Note 1	-	-	-	60.75	97.20	Site dml, conc, 7" to 24" thick, plain	C.Y.	
2	3123 2318 015C	2.96	4.61	2.03	9.60	19.20	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
2	3123 2318 213C	0.17	1.28	0.22	1.67	2.67	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
						125.06	Totals		

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104 Water Tank

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	See Note 1	-	-	-	60.75	243.00	Site dmil, conc, 7" to 24" thick, plain	C.Y.	
6	3123 1642 165C	0.29	0.51	0.19	0.99	5.94	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
4	3123 2318 213C	0.17	1.28	0.22	1.67	6.68	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
79	0241 1927 002C	0.20	0.64	0.37	1.21	95.59	Torch cutting steel, 1" thick plate	L.F.	
2	3123 2318 015C	2.96	4.61	2.03	9.60	19.20	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
						370.41	Totals		

105 Diesel Fuel Tank

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	See Note 1	-	-	-	60.75	243.00	Site dmil, conc, 7" to 24" thick, plain	C.Y.	
4	3123 1642 165C	0.29	0.51	0.19	0.99	3.96	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
1	0265 1030 102S	-	1,050.00	#####	1,155.00	1,155.00	Removal of ugnd stor tk, 9000gal to 12,000gal tank	Ea.	
1	0265 1030 102S	-	1,050.00	#####	1,155.00	1,155.00	Removal of ugnd stor tk, haul to certified salv dump, 9000gal-'	Ea.	
4	3123 2318 213C	0.17	1.28	0.22	1.67	6.68	Hauling, off hwy haulers, 60 CY rear/bot dump, 1000' RT, 3.6 l	C.Y.	
						2,563.64	Totals		

106 C-111 Cover

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
257	0241 1927 002C	0.20	0.64	0.37	1.21	310.97	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
12	See Note 1	-	-	-	60.75	747.23	Site dmil, conc, 7" to 24" thick, plain	C.Y.	
27	3123 1642 165C	0.29	0.51	0.19	0.99	27.03	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
15	3123 2318 010C	2.36	3.68	1.66	7.70	115.50	Hauling, LCY, no loading, 6 c.y dump truck, 2 MI RT, 2.6 lds/h	C.Y.	
12	3123 2318 122C	1.07	2.06	0.79	3.92	48.22	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
						1,248.94	Totals		

107 Switch Gear #3

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
893	0241 1615 010C	0.10	0.13	0.06	0.29	258.97	Explosive/implosive dmil, no disposal, conc bldg	C.F.	
10	See Note 1	-	-	-	60.75	607.50	Site dmil, conc, 7" to 24" thick, plain	C.Y.	
43	3123 1642 165C	0.29	0.51	0.19	0.99	42.57	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
43	3123 2318 122C	1.07	2.06	0.79	3.92	168.56	Hauling, LCY, no loading, 20 c.y dump trailer, 3 MI RT, 1.7 lds	C.Y.	
400	0241 1921 100C	2.69	1.51	1.65	5.85	2,340.00	Gutting, building interior, including disposal, commercial bldg,	SF Flr.	
						3,417.60	Totals		

108 B-8 Overland Belt

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2,082	0241 1927 002C	0.20	0.64	0.37	1.21	2,519.22	Steel cutting, torch cutting, 1" thick	L.F.	
427	3123 1642 160I	0.38	0.31	0.22	0.91	388.57	Excavating, bulk bank measure, FE loader, whl mtd, 3 CY cap	C.Y.	
29	0241 1919 010C		90.00	-	90.00	2,580.30	Dump charges, typical urban city, fees only, bldg constr materi	Ton	
5	0154 3340 610C		4.60		4.60	23.00	Circular saw rental	S/day	
50	3123 2318 113C	4.38	8.20	3.22	15.80	790.00	Hauling, LCY, no loading, 16.5 c.y dump trailer, 20 mi RT, .4 k	C.Y.	
66	3123 2318 470C	-	1.20	0.12	1.32	87.12	Highway hauling beyond 20 miles, per loaded mile, minimum	Mile	
377	3123 2318 015C	2.96	4.61	2.03	9.60	3,619.20	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
						10,007.41	Totals		

109 Hopper

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
123	0241 1927 002C	0.20	0.64	0.37	1.21	148.83	Steel cutting, hand burning, including prep, steel to 1/2" thick	L.F.	
3	3123 1642 165C	0.29	0.51	0.19	0.99	2.87	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
3	3123 2318 010C	2.36	3.68	1.66	7.70	22.33	Hauling, LCY, no loading, 6 c.y dump truck, 2 MI RT, 2.6 lds/h	C.Y.	
						174.03	Totals		

110 Transfer Tower

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
995	3123 1642 165C	0.29	0.51	0.19	0.99	985.05	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
995	3123 2318 010C	2.36	3.68	1.66	7.70	7,661.50	Hauling, LCY, no loading, 6 c.y dump truck, 2 MI RT, 2.6 lds/h	C.Y.	
240	0241 1927 002C	0.20	0.64	0.37	1.21	290.40	Steel cutting, torch cutting, 1" thick	L.F.	
						8,936.95	Totals		

111 Stacker/Reclaimer

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,202	0241 1927 002C	0.20	0.64	0.37	1.21	3,874.42	Steel cutting, torch cutting, 1" thick	L.F.	
1,588	3123 1642 160I	0.38	0.31	0.22	0.91	1,445.08	Excavating, bulk bank measure, FE loader, whl mtd, 3 CY cap	C.Y.	
40	0241 1919 010C		90.00	-	90.00	3,600.00	Dump charges, typical urban city, fees only, bldg constr materi	Ton	
5	0154 3340 610C		4.60		4.60	23.00	Circular saw rental and labor	S/day	
88	3123 2318 113C	4.38	8.20	3.22	15.80	1,390.40	Hauling, LCY, no loading, 16.5 c.y dump trailer, 20 mi RT, .4 k	C.Y.	
132	3123 2318 470C	-	1.20	0.12	1.32	174.24	Highway hauling beyond 20 miles, per loaded mile, minimum	Mile	
1,500	3123 2318 015C	2.96	4.61	2.03	9.60	14,400.00	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
11,051	3123 1632 210C	1.36	5.70	1.24	8.30	91,723.30	Ripping, trap rock, very hard, 460 HP dozer, adverse conditior	C.Y.	
						116,630.44	Totals		

112 Cap Magazine

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
2	3123 1642 1650	0.29	0.51	0.19	0.99	1.98	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
2	3123 2318 0150	2.96	4.61	2.03	9.60	19.20	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
						21.18	Totals		

113 Anfo Trailer Storage

114 Detonator Magazine

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	3123 1642 1650	0.29	0.51	0.19	0.99	3.96	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
4	3123 2318 0150	2.96	4.61	2.03	9.60	38.40	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
26	0241 1927 0020	0.20	0.64	0.37	1.21	31.46	Torch cutting steel, 1" thick plate	L.F.	
						73.82	Totals		

115 Anfo Bin

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4	3123 1642 1650	0.29	0.51	0.19	0.99	3.96	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
4	3123 2318 0150	2.96	4.61	2.03	9.60	38.40	Hauling, LCY, no loading, 6 c.y dump truck, 3 MI RT, 2.1 lds/h	C.Y.	
51	0241 1927 0020	0.20	0.64	0.37	1.21	61.71	Torch cutting steel, 1" thick plate	L.F.	
						104.07	Totals		

Removal of Chain Link Fences and Gates

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1	0241 1362 0400	75.50	24.50	43.00	143.00	143.00	Selective demo, chain link gate, 20' wide	Ea.	
1	0241 1362 0400	75.50	24.50	43.00	143.00	143.00	Selective demo, chain link gate, 20' wide	Ea.	
4,000	0241 1362 0600	0.85	0.27	0.48	1.60	6,400.00	Selective demo, chain link fence, 5' tall	L.F.	
						6,686.00			

Demolition of Concrete & Asphalt Roadways and Flatwork in Process Area

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
14,126	See Note 1	-	-	-	60.75	858,154.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
15,767	3123 1642 1650	0.29	0.51	0.19	0.99	15,609.33	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
14,767	0241 1317 5050	3.11	2.14	1.90	7.15	105,584.05	Site demo, no hauling, pavement removal, bit, 4" to 6" thick	S.Y.	
1,689	3123 2318 1150	0.73	1.40	0.53	2.66	4,492.74	Hauling, LCY, no loading, 20 c.y dump trailer, 1 MI RT, 2.5 lds	C.Y.	
27,845	3123 1632 2500	0.39	1.28	0.32	1.99	55,411.55	Ripping, shale, medium hard, 300 HP dozer, adverse conditio	C.Y.	
						1,039,252.17	Totals		

North Road Access

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,458	See Note 1	-	-	-	60.75	88,573.50	Site dml, conc, 7" to 24" thick, plain	C.Y.	
1,638	3123 1642 1650	0.29	0.51	0.19	0.99	1,621.62	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
180	0241 1317 5050	3.11	2.14	1.90	7.15	1,287.00	Site demo, no hauling, pavement removal, bit, 4" to 6" thick	S.Y.	
1,638	3123 2318 1150	0.73	1.40	0.53	2.66	4,357.08	Hauling, LCY, no loading, 20 c.y dump trailer, 1 MI RT, 2.5 lds	C.Y.	
4,222	3123 1632 2500	0.39	1.28	0.32	1.99	8,401.78	Ripping, shale, medium hard, 300 HP dozer, adverse conditio	C.Y.	
						104,240.98	Totals		

South Access Road

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
4,444	See Note 1	-	-	-	60.75	269,973.00	Site dml, conc, 7" to 24" thick, plain	C.Y.	
4,444	3123 1642 1650	0.29	0.51	0.19	0.99	4,399.56	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
4,444	3123 2318 1150	0.73	1.40	0.53	2.66	11,821.04	Hauling, LCY, no loading, 20 c.y dump trailer, 1 MI RT, 2.5 lds	C.Y.	
10,667	3123 1632 2500	0.39	1.28	0.32	1.99	21,227.33	Ripping, shale, medium hard, 300 HP dozer, adverse conditio	C.Y.	
						307,420.93	Totals		

Reclamation Channels

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
8,000	3123 1642 1650	0.29	0.51	0.19	0.99	7,920.00	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	
14,223	3125 1310 0120		6.16	-	6.16	87,613.68	Erosion Control Mat	S.Y.	
14,223	3125 1310 0120	0.46		0.38	0.84	11,947.32	Install Erosion Control Mat	S.Y.	
8,000	3123 1632 2500	0.39	1.28	0.32	1.99	15,920.00	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						123,401.00	Totals		

Pond #1:

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
48,000	3123 23.15 6045	0.32	0.26	0.77	1.35	64,800.00	Borrow, Loading, and/or Spreading, FEL whl mtd, 3 cy bucke	C.Y.	
48,000	3123 23.18 2010	0.37	1.57	0.37	2.31	110,880.00	Hauling, 22 CY rear/bottom dump off-hwy hauler	C.Y.	
48,000	3123 23.15 6045	0.32	0.26	0.77	1.35	64,800.00	Borrow, Loading, and/or Spreading, FEL whl mtd, 3 cy bucke	C.Y.	
						240,480.00	Totals		

Pond #2

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,184	3123 1632 2500	0.39	1.28	0.32	1.99	6,336.16	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						6,336.16	Totals		

Pond #3

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,328	3123 1632 250C	0.39	1.28	0.32	1.99	2,642.72	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						2,642.72	Totals		

Pond #4

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
784	3123 1632 250C	0.39	1.28	0.32	1.99	1,560.16	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						1,560.16	Totals		

Pond #5

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
204	3123 1632 250C	0.39	1.28	0.32	1.99	405.96	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						405.96			

Pond #6

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,296	3123 1632 250C	0.39	1.28	0.32	1.99	6,559.04	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						6,559.04	Totals		

Pond #7

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
6,608	3123 1632 250C	0.39	1.28	0.32	1.99	13,149.92	Ripping, trap rock, medium hard, 300 HP dozer, adverse cond	C.Y.	
						13,149.92	Totals		

Ripping Road Under Crusher Conveyor Belt

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,371	3123 1632 210C	1.36	5.70	1.24	8.30	11,379.30	Ripping, trap rock, very hard, 460 HP dozer, adverse condition	C.Y.	
						11,379.30	Totals		

Ripping Exploration Roads SE of Quarry (Burma Road)

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
8,244	3123 1632 210C	1.36	5.70	1.24	8.30	68,425.20	Ripping, trap rock, very hard, 460 HP dozer, adverse condition	C.Y.	
						68,425.20	Totals		

Ripping The Remaining Portion of a Branch Road to The Process Facilities

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
323	3123 1632 210C	1.36	5.70	1.24	8.30	2,680.90	Ripping, trap rock, very hard, 460 HP dozer, adverse condition	C.Y.	
						2,680.90	Totals		

~~***Ripping on The West Side of The Quarry***~~

~~Qty~~	~~CSI Number~~	~~Labor~~	~~Equip/Mat'ls~~	~~O&P~~	~~Tot. Unit Cost~~	~~Cost~~	~~Description~~	~~Unit~~	~~Note~~
~~5,560~~	~~3123 1632 210C~~	~~1.36~~	~~5.70~~	~~1.24~~	~~8.30~~	~~46,065.00~~	~~Ripping, trap rock, very hard, 460 HP dozer, adverse condition~~	~~C.Y.~~	~~1. Ripping the roads on the west side of the Quarry.~~
							~~Totals~~		

Ripping Road To Quartzite Quarry

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
3,872	3123 1632 210C	1.36	5.70	1.24	8.30	32,137.60	Ripping, trap rock, very hard, 460 HP dozer, adverse condition	C.Y.	
						32,137.60	Totals		

Ripping Road To Stacker/Reclaimer

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
1,371	3123 1632 210C	1.36	5.70	1.24	8.30	11,379.30	Ripping, trap rock, very hard, 460 HP dozer, adverse condition	C.Y.	
						11,379.30	Totals		

Surety Estimate Using 2007 Construction Cost Data - Ash Grove Cement Co. - Leamington Plant & Quarry

Reclamation Revegetation of Ultimate Disturbed Area[3]

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
497					210.00	104,370.00	Seed Mix	acre	Revegetate area outside pit, incl. waste rock pile
373					125.00	46,593.75	Hand broadcast seeding	acre	Revegetate area outside pit, incl. waste rock pile
124					1,200.00	149,100.00	Hydroseeding	acre	Revegetate area outside pit, incl. waste rock pile
621					18.00	11,182.50	Composted manure, 250 ac. @ 5t/ac, applied to 1/4 reveg are	ton	Revegetate area outside pit, not incl. waste rock pile
124					2,500.00	310,625.00	Spreading composted manure	acre	Blend and spread soil and composted manure.
30					210.00	6,300.00	Seed Mix	acre	Reveg pit floor. Assume 30 acres on floor
30					125.00	3,750.00	Hand broadcast seeding	acre	Reveg pit floor. Assume 30 acres on floor
150					18.00	2,700.00	Composted manure, 30 ac. @ 5t/ac	ton	Reveg pit floor. Assume 30 acres on floor
30					2,500.00	75,000.00	Spreading composted manure	acre	Reveg. pit floor. Blend and spread soil and composted manure.
						709,621.25		Totals	

Waste Rock Pile Topsoil Redistribution[3]

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
94,000	3123 1642 1650	0.29	0.51	0.19	0.99	93,060.00	Excavating, bulk bank measure, FE loader, whl mtd, 5 CY cap	C.Y.	Remove material from storage area
3,150					18.00	56,700.00	Composted manure @ 65#/cyd soil	ton	Based on a January 2008 est. from WRR Industries, Ogden, Utah
97,150	3123 2317 0190	0.70	2.17	0.59	3.46	336,139.00	Mix soil & amdt - Fill, spread fill, with dozer 300 h.p 300' haul	C.Y.	
97,150	3123 2318 0030	1.48	2.30	1.03	4.81	467,291.50	Hauling, LCY, no loading, 6 c.y dump truck, 1/2 MI RT, 4.1 lds	C.Y.	
29					2,500.00	72,500.00	Distr. Amdt. Soil - Fill, spread fill, with dozer 300 h.p 300' haul	acre	Distribute material on waste rock dump
						1,025,690.50		Totals	

Site Cleanup and Trash Removal

Qty	CSI Number	Labor	Equip/Mat'ls	O&P	Tot. Unit Cost	Cost	Description	Unit	Note
731					12.00	8,772.00	Site cleanup	acre	1. Assumes 1 laborer @$15/hr can cover 10 acres per 8 hour shift
						8,772.00		Totals	

Subtotal		**4,805,868.46**
Contingency (10%)	$	480,588.85
Reclamation Supervision[2] (10%)	$	480,588.85
√Demob (from attached MOB/DEMOB COSTS FOR RECLAMATION EQUIPMENT	$	12,810.00
	$	5,779,876.15
Escalate for 5 years at 3.2% per year	$	985,890.56
Rounded Surety Amount in Year 2012 dollars	**$**	**6,765,766.72**
Average Cost per Disturbed Acre (731 acres) =	$	9,255.49

Notes

All ripping will be performed to a depth of at least 24 inches.

Added Overhead and Profit to tabulation in 2007

[1]Concrete demolition unit cost based on a January 2008 phone quote from Strong Brothers Trucking, South Jordan, UT

[2]Changed Reclamation Supervision from $11,160 in 2001 to 10% of reclamation cost in 2007

[3]Revegetation assumes an area of 497 acres outside the pit, three-quarters of which will be hydroseeded, and one-quarter of which will be seeded via hand broadcasting. It is assumed that composted manure will be applied to one-quarter of this area (124 acres) at an average rate of 5 tons per acre. Also included in this estimate are 30 acres of revegetation inside the pit, all of which will include soil amendments. Seed mix un it costs are based on a January 2008 phone quote from Granite Seed, Lehi, Utah. Seeding (broadcast and hydro) and manure/manure spreading unit costs are based on a January 2008 phone quote from WRR Industries, Ogden, Utah.

ASH GROVE CEMENT COMPANY - LEAMINGTON QUARRY, UTAH MOB/DEMOB COSTS FOR RECLAMATION EQUIPMENT				
Equipment Type	Quantity	Mob Rate ($/mi)	RT Distance (mi)	Mob/Demob Cost
Water Truck	1	$3.50	140	$490
D8 Dozer	2	$6.50	140	$1,820
Backhoe, Track Mtd., 3 cyd bucket	2	$6.25	140	$1,750
Backhoe, Track Mtd., 1.5 cyd bucket	2	$4.50	140	$1,260
Haul Truck, 42 cyd cap.	6	$4.50	140	$3,780
Front End Loader, 5 cyd cap.	3	$4.50	140	$1,890
Crane, 150 ton cap., truck mounted	1	$8.00	140	$1,120
Hydromulcher	1	$5.00	140	$700
			TOTAL	$12,810

Mob/Demob estimates based on August 2007 phone quote from Wheeler Machinery, Lindon, Utah, unless otherwise noted.
No pilot vehicles are required for equipment mobilization.
The mobilization point is Draper, Utah.

Appendix 13

ASH GROVE CEMENT - HANK ALLEN PIT
RECLAMATION WATERSHED PEAK FLOWS
100-YEAR, 6-HOUR STORM EVENT

Watershed	Watershed Area (sq. ft.)	Watershed Area (acres)	Hydraulic Length - I (ft)	Avg watershed slope - Y (%)	Duration of stom (hr)	Curve Number (CN)	Potential Max. Retention - S (in.)	Lag - L (hr)	Time of Concentration - T_c (hr)	Peak Flow (cfs)
RWS-1	35,479,128	814.5	10,473	52.2	6	81	2.35	0.28	0.47	328.0
RWS-2	3,636,800	83.5	4,080	23.5	6	77	2.99	0.22	0.37	25.3
RWS-3	724,800	16.6	1,440	30.9	6	80	2.50	0.08	0.13	9.2
RWS-4	10,380,800	238.3	6,960	45.9	6	81	2.35	0.21	0.36	109.1

Notes

Watersheds shown on Reclamation Watershed Map attached

$S = (1000/CN) - 10$

$L = [(I^{0.8} (S+1)^{0.7}]/(1900Y^{0.5})$

$T_c = 1.67L$

Peak flow calculated with SCSHYDRO Program assuming a 2.1", 6 hr. long rainfall event with a SCS Type "b" Storm Distribution

Reclamation Channel	Steepest Slope (ft/ft)	Flattest Slope (ft/ft)	Side Slope (ft/ft)	Channel Depth (ft)	Bottom Width (ft)	Peak Flow Velocity (fps)	Peak Flow Depth (ft)
RC-1	0.072	0.037	5H:1V	2.0	18	12.39	1.35
RC-2	0.056	0.003	5H:1V	1.0	30	3.98	0.49
RC-3	0.020	0.020	3H:1V	1.5	0	3.92	0.88
RC-4	0.087	0.087	5H:1V	1.0	20	8.94	0.54
Swale	0.050	0.050	10H:1V	1.5	5	19.03	1.09

Notes

Flow velocities and depths calculated with Flowmaster 6.0 Program

Peak velocities were assumed to occur at the location of the steepest channel slope, and peak depths were assumed to occur at the location of the flattest channel slope

Calculations assume a Manning's roughness of 0.03 (smooth vegetated channel) for all channels and 0.13 (concrete) for the swale

RC-3, RC-4, and the swale will have constant slopes.

POND 7 SUMMARY TABLE

Elevation of Invert (ft msl)	4,900.0
Elevation of Crest (ft msl)	4,921.4
Elevation of Spillway (ft msl)	4,920.4
Length of Spillway (ft)	25
Breadth of Spillway (ft)	15
Calculated Annual Sediment Volume (ft^3)[a]	6.6
Stage Corresponding to 60% Sediment Capacity/Cleanout Elevation (ft msl)[b]	4,900.1
Peak Stage Corresponding to 10-Year, 24-Hour Precipitation Event (ft msl)[c]	4,920.3
Volume of 10-Year, 24-Hour Precipitation Event (ft^3)[d]	551,939
Maximum Pond Storage volume (ft^3)[b]	558,297
Peak Stage Corresponding to 25-Year, 6-Hour Precipitation Event Initiating when Water Impounded to the Spillway Elevation (4920.4 feet msl)[e]	4,921.2
Peak Pond Spillay Outflow During the Above-Mentioned Event (cfs)[e]	56.1
Peak Spillway Flow Velocity During the Above-Mentioned Event (ft/s)[e]	2.35

[a] Refer to Hank Allen Pit Pond 7 Sediment Yield Calculations Table attached.

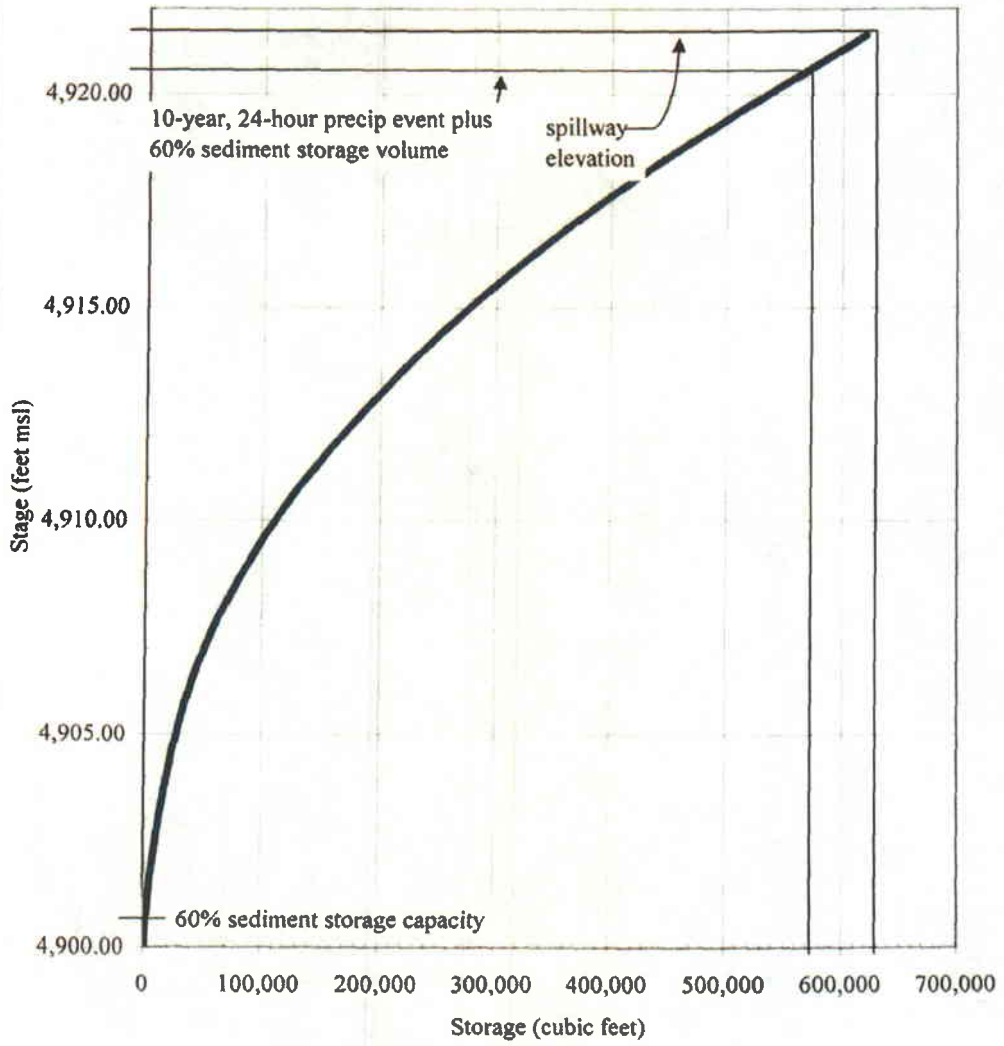
[b] Refer to Storage vs. Stage graph attached.

[c] Refer to Pond 7 10-24 HydroCAD output sheets (p.3) attached

[d] Refer to Hank Allen Pit Pond 7 Hydrology Calculations table attached

[e] Refer to Pond 7 25-6 HydroCAD output sheets (p.3-4) attached

Pond 7: Storage vs. Stage



HANK ALLEN PIT POND 7 HYDROLOGY CALCULATIONS

Runoff Volume

Storm (Rec. Int. - Duration)	Watershed	Watershed Area (sq. ft.)	Watershed Area (acres)	Precip. P (in)	Hydraulic Length - l (ft)	Avg watershed slope - Y (%)	Duration of stom (hr)	Curve Number (CN)	Potential Max. retention S (in.)	Lag - L (hr)	Time of Concentration Tc (hr)	Runoff - Q (in)	Runoff Volume - V (ft^3)
10-24	POND 7	18,083,139	415.1	1.78	7,761	0.37	24	78	2.82	2.86	4.77	0.37	551,939

Notes

Refer to attached figure for locations of watersheds and soils units

Calculations based on Soil Conservation Service (SCS) Method, National Engineering Handbook Section 4, Chapters 9 & 10 by Victor Mockus, 1972

$S = (1000/CN) - 10$

$L = [(l^{0.8} (S+1)^{0.7}]/(1900Y^{0.5})$

$T_c = 1.67L$

$Q = (P - 0.2*S)^2 / (P + 0.8*S)$

$V = Area * Q$

Average Watershed Slope Calculation (Sum of lengths of contour lines X contour interval / Area)

Contour	Length
6,750	144
6,550	1,382
6,350	1,856
6,150	3,753
5,950	3,409
5,750	4,902
5,550	6,766
5,350	6,090
5,150	3,278
4,950	1,959
TOTAL	**33,539**
AvgSlope	**37.1%**

Curve Number Calculation

Curve numbers determined using weighted averages of vegetation, disturbance, and NRCS soils areas

Area No.	Area (ft2)	CN
Dist	2,513,603	93
Non Dist	15,569,536	76
TOTAL	18,083,139	
Avg CN	78	

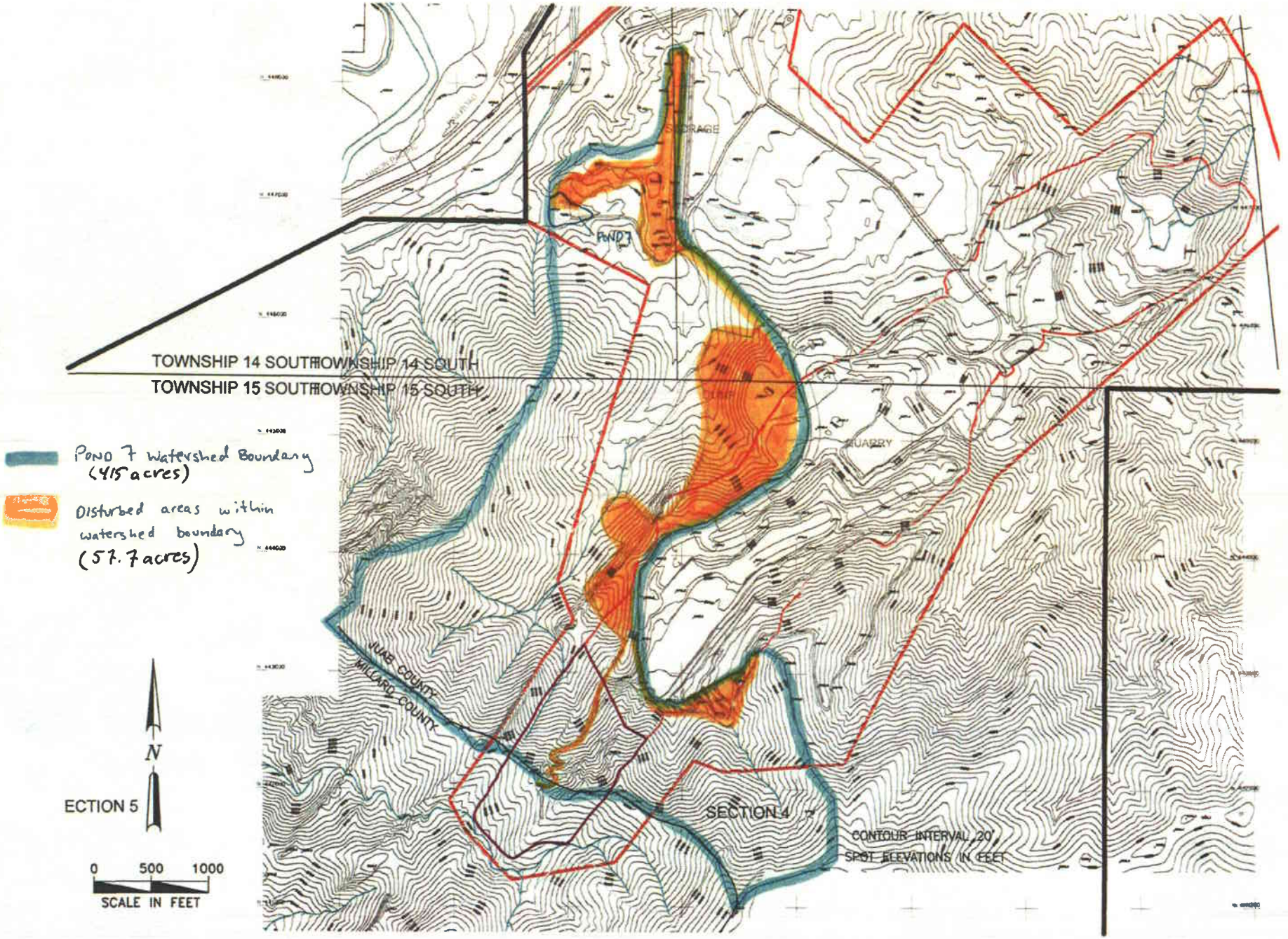
Note: Avg CN = (Σ $Area_n$ X CN_n)/ Total Watershed Area

Curve Numbers for Each Region in Watershed

Hyd Soil Group	D
Disturbed Areas	93
Non Disturbed	76

Note

The NRCS soils map does not show the hydrologic soil group for all of the soils in the watershed, so they have conservatively been taken as D Curve Numbers for non disturbed areas from UDOT Manual of Instruction Table 7-15 (pinyon-juniper with grass understory, fair (80) to good (71) condition). Curve Number for disturbed areas taken from UDOT Manual of Instruction Table 7-13 (fallow cover with crop residue, poor condition).



Pond 7 watershed and soils

HANK ALLEN PIT POND 7 SEDIMENT YIELD CALCULATIONS

A = R K LS VM
Annual Sediment Volume = A X Area / Soil Density

SOUTH PIT

Area No.	Area	Area (ac)	Descr.	Avg. Slope s	Slope Length l (ft)	m	LS	R	K	VM	A (t/ac/yr)	Soil Density (pcf)	Annual Sediment Volume (ft^3)
1	150,451	3.45	Low Dist'd	9.81%	200	0.5	0.12	7.3	0.05	0.35	0.01	110	1
2	127,838	2.93	Low Dist'd	16.98%	200	0.5	0.12	7.3	0.05	0.35	0.02	110	1
3	433,532	9.95	Dist'd	2.81%	150	0.3	0.08	7.3	0.05	0.90	0.03	110	5
												TOTAL	7

Notes

Due to the presence of large boulders at the base of the waste rock pile and large undisturbed areas, the portion of the watershed located south of the inlet to Pond #7 was considered to have a negligible sediment contribution. Thus, only the portion of the watershed located north of the inlet (storage area, roads, and disturbed pads and slopes) was considered to contribute sediment to Pond #7.

Refer to locations of areas on attached map.

s = slope angle (%). Taken as the average slope of each area.

l = slope length (ft). This value is defined as the distance from the origin of overland flow to the point of deposition or channelized flow. Slope lengths rarely exceed 400 feet, and in this case, the presence of rocks, trees, and roads, and channels are estimated to limit the slope length to 150 to 200 feet.

m = a factor in the LS equation which is 0.5 for slopes steeper than 5%, and 0.3 for 1-3% slopes .

$LS = ((65.41s^2/(s^2+10{,}000)) + 4.56s/(s^2+10{,}000)^{0.5} + 0.065) / (l/72.6)^m$ (Israelsen et al., 1984)

R is taken from isoerodent map of Utah as 7.3.

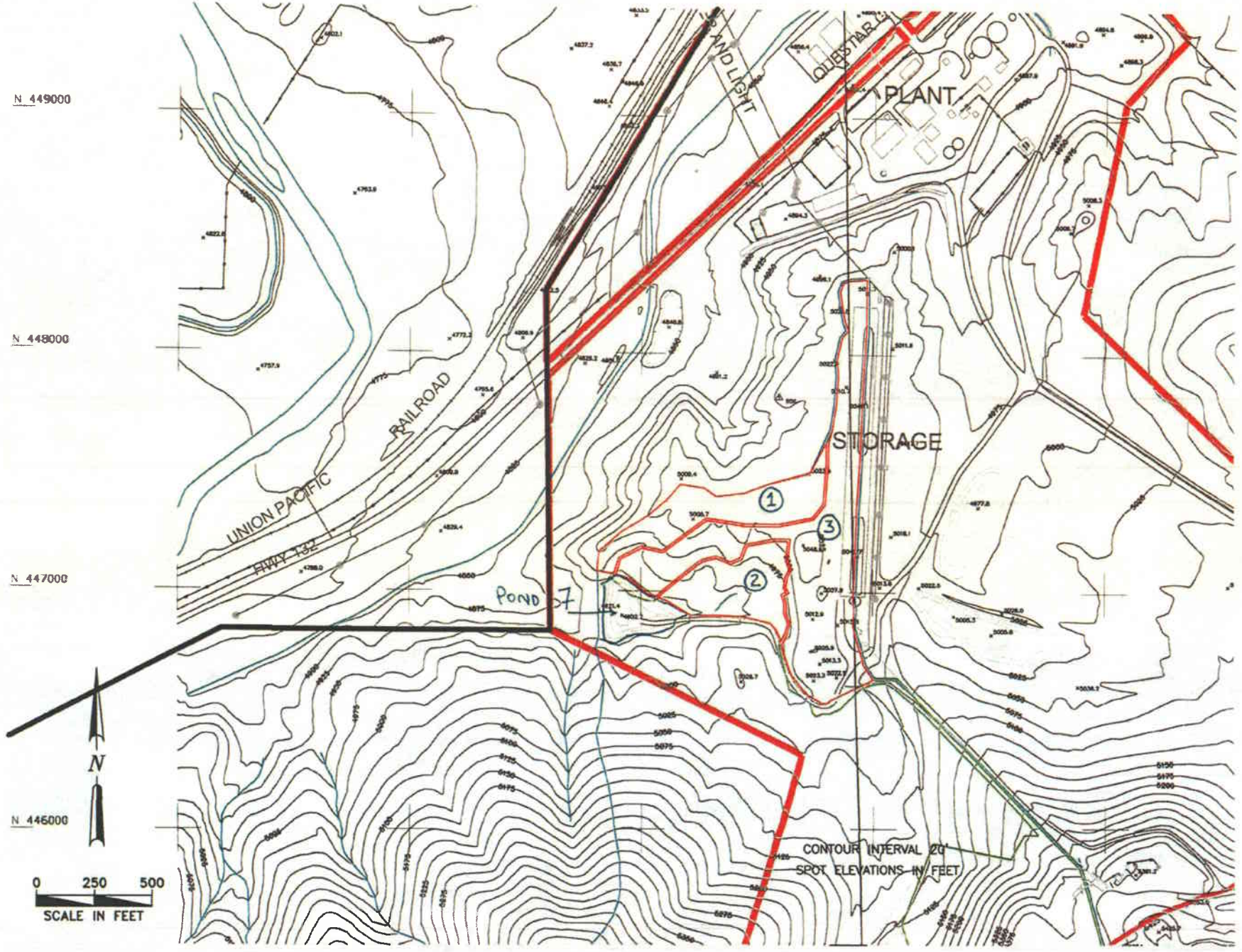
K is taken from NRCS soil surveys as 0.05 (Lodar-Rock Outcrop Complex).

VM values are taken from Table 3 (Isrealson et al, 1984) as follows: 0.35 for undisturbed areas (brush), 0.90 for disturbed areas (bare soil tracked all directions/loose to 12" smooth).

Soil density assumed to be 110 pcf.

Reference:

Israelsen, C. Earl, Joel E. Fletcher, Frank W. Haws, and Eugene K. Israelsen, 1984. *Erosion and Sedimentation in Utah: A Guide for Control*. Hydraulics and Hydrology Series UWRL/H-84/03. Utah Water Research Laboratory, College of Engineering, Utah State University, Logan, Utah.



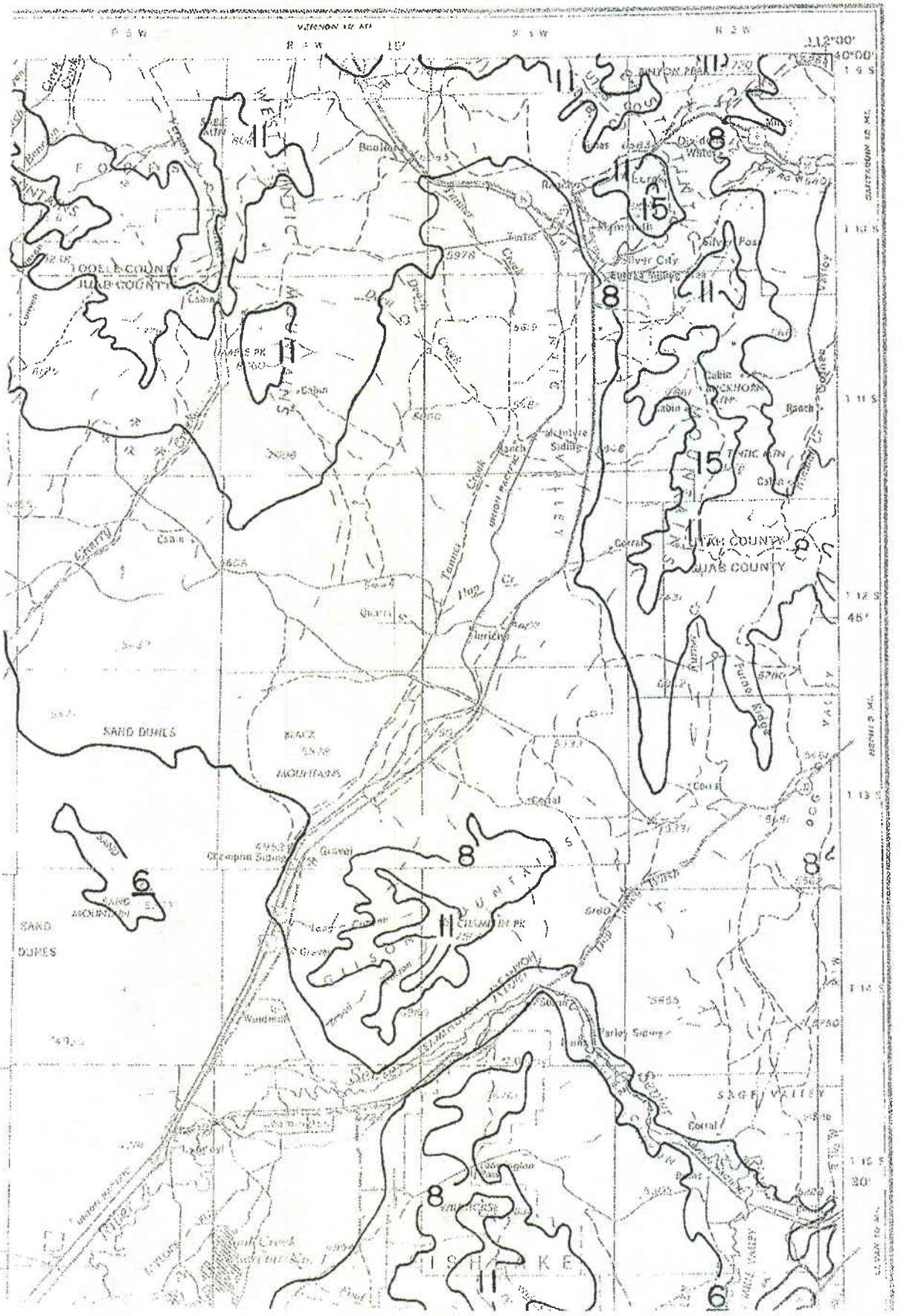
Pond 7 Sediment Yield Areas

Source: Israelsen et al, 1984

ISO-ERODENT (R) VALUES

MAP R 6
DELTA

NJ 12-1
SERIES V502



Source: Israelsen et al, 1984

Table 3. Typical VM factor values reported in the literature.[a]

Condition	VM Factor
1. Bare soil conditions	
freshly disked to 6-8 inches	1.00
after one rain	0.89
loose to 12 inches smooth	0.90
loose to 12 inches rough	0.80
compacted bulldozer scraped up and down	1.30
same except root raked	1.20
compacted bulldozer scraped across slope	1.20
same except root raked across	0.90
rough irregular tracked all directions	0.90
seed and fertilizer, fresh	0.64
same after six months	0.54
seed, fertilizer, and 12 months chemical	0.38
not tilled algae crusted	0.01
tilled algae crusted	0.02
compacted fill	1.24-1.71
undisturbed except scraped	0.66-1.30
scarified only	0.76-1.31
sawdust 2 inches deep, disked in	0.61
2. Asphalt emulsion on bare soil	
1250 gallons/acre	0.02
1210 gallons/acre	0.01-0.019
605 gallons/acre	0.14-0.57
302 gallons/acre	0.28-0.60
151 gallons/acre	0.65-0.70
3. Dust binder	
605 gallons/ac Fiber Glass Roving	1.05
1210 gallons/acre	0.29-0.78
4. Other Chemicals	
1000 lb. Fiber Glass Roving with 60-150 gallons asphalt emulsion/acre	0.01-0.05
Aquatain	0.68
Aerospray 70, 10 percent cover	0.94
Curasol AE	0.30-0.48
Petroset SB	0.40-0.66
PVA	0.71-0.90
Terra Tack	0.66
Wood fiber slurry,[b] 1000 lb/acre fresh	0.05-0.73
Wood fiber slurry,[b] 1400 lb/acre fresh	0.01-0.36
Wood fiber slurry,[b] 3500 lb/acre fresh	0.009-0.10
Portland Cement and Latex	
1000 lbs/ac + 8 gal/ac	0.13
1500 lbs/ac + 12 gal/ac	0.006
5. Seedings	
temporary, 0 to 60 days	0.40
temporary, after 60 days	0.05
permanent, 0 to 60 days	0.04
permanent, 2 to 12 months	0.05
permanent, after 12 months	0.01
6. Brush	0.35
7. Excelsior blanket with plastic net	0.04-0.10
8. Mulch (see Figures 3, 4, 5, 6)	

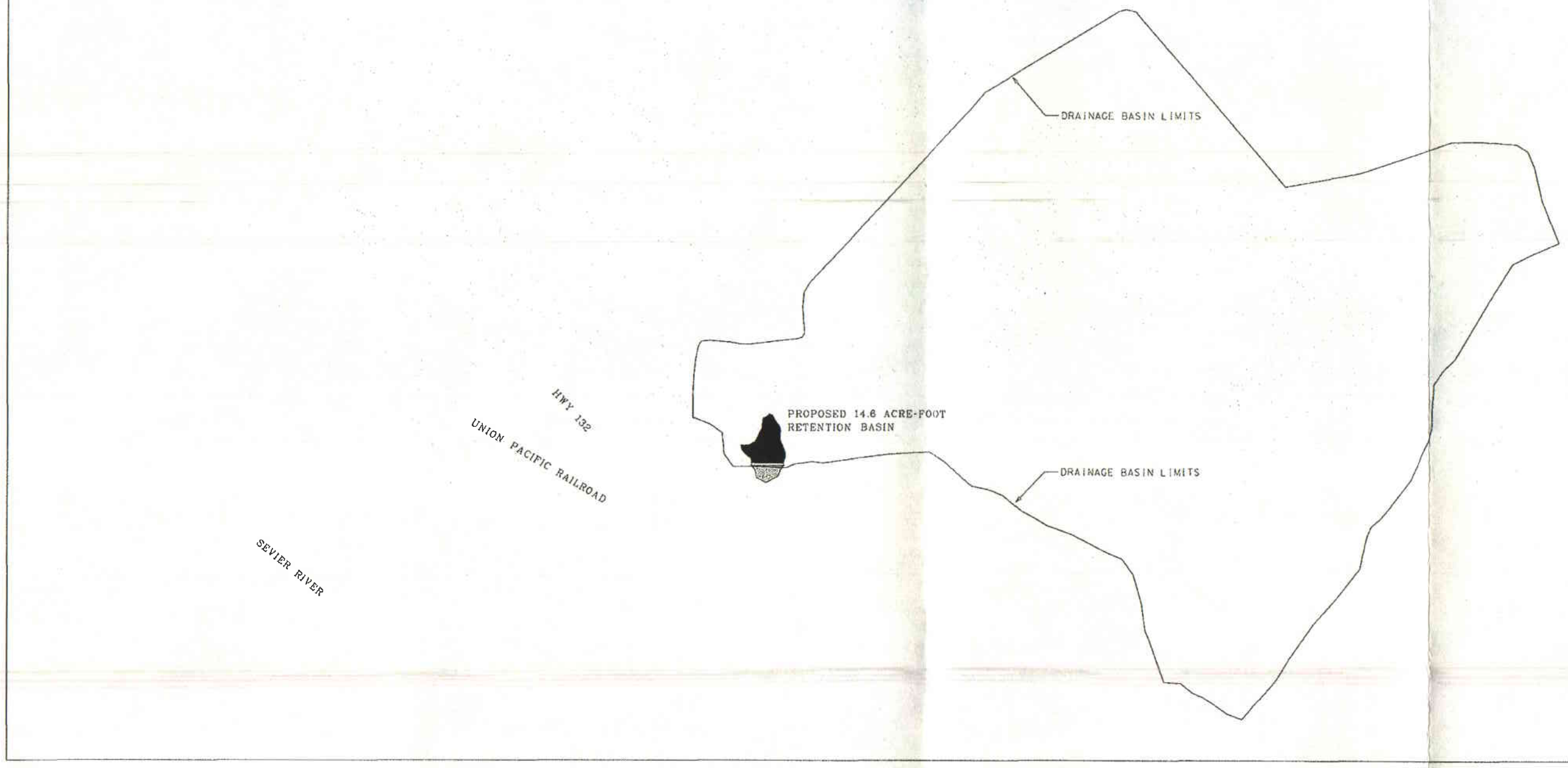
[a]Note the variation in values of VM factors reported by different researchers for the same measures.

[b]This material is commonly referred to as hydromulch.

the critical exposed area will be reduced. A construction operation scheduled in phases is especially valuable in dealing with long slopes, because stabilizing the upper portion of the slope will protect the lower area.

For each phase of construction, control measures which will serve to protect exposed areas and adjacent property, such as sediment traps, basins or ponds, and diversion ditches, should be installed before clearing and grading begin. Structures such as these do not decrease erosion but serve to catch the sediment after it has left the source area. Design drawings for such structures are readily available from local offices of the Soil Conservation Service and from other sources and are not included in this handbook. Even though much research remains to be done in order to determine the true efficiencies and optimum designs of sediment basins and traps, existing designs may be used effectively to prevent sediment from leaving rights-of-way and entering streams, lakes, or adjacent properties. The amount of sediment captured in such structures can be measured or calculated and subtracted from the total soil loss, determined by the equation, to estimate actual loss. Where areas are to be left for long periods of time, temporary measures such as vegetation, berms, down drains, and mulch covers should be installed to protect and stabilize the exposed soil surface, and then permanent control measures should be implemented as soon as is practical.

Much can be done to minimize erosion and sedimentation if problems are anticipated and provided for before development begins, and if control measures are implemented in a timely manner.



RECORD DRAWINGS

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NO.	DESCRIPTION	BY	APPR.	DATE
1	UPDATES FROM FINAL GEOTECH REPORT	BRD		10-30-00
2	RECORD DRAWINGS	BRD		3-15-01
3				
4				

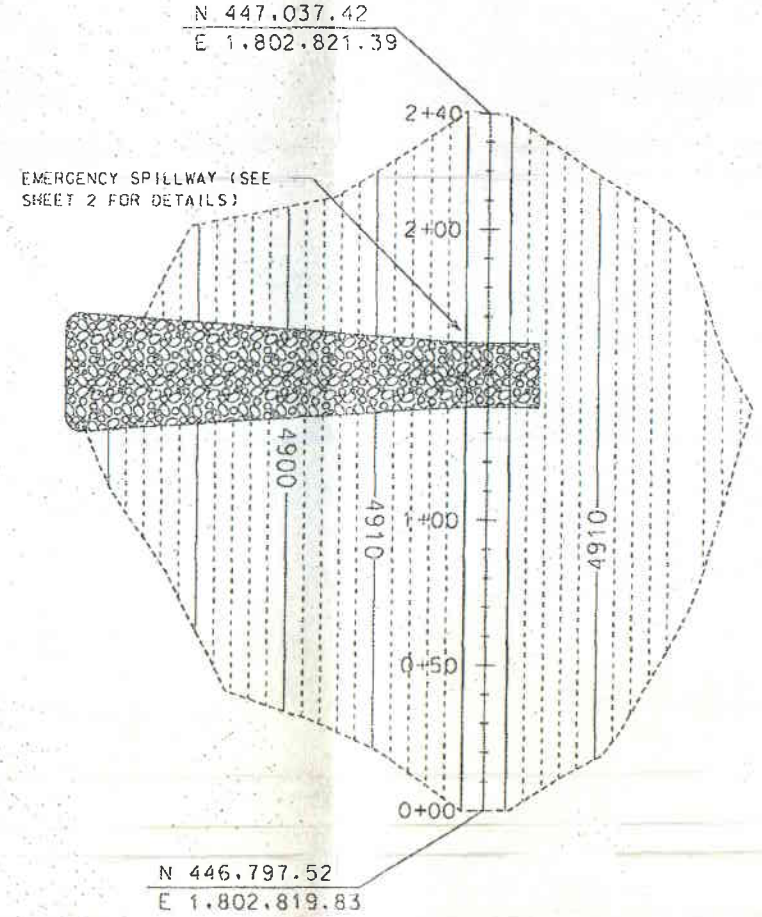
ASH GROVE CEMENT COMPANY

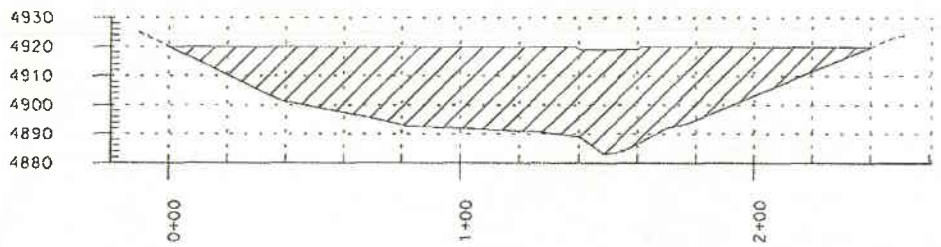
RETENTION BASIN
GENERAL SITE PLAN VIEW

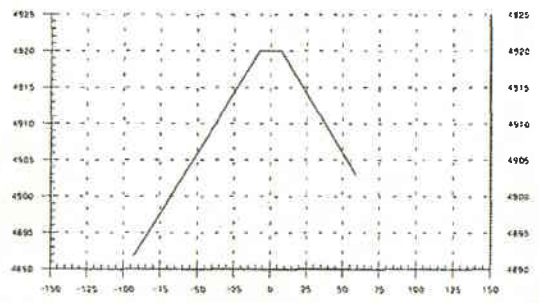
PLOT DATE: 5/19/2008
CAD DWG: $FILEABBREV$
PLOT SCALE:
0 1 INCH
DATE: SEPT 2000
DRAWN BY: BRD
DESIGN BY: BRD
CHECKED BY:
HOR SCALE: 1" = 400'
VER SCALE: N/A
SHEET 1 OF 3

NOTES:

1 - PRIOR TO CONSTRUCTION UNSUITABLE SOILS AND VEGETATION SHALL BE REMOVED FROM THE AREA WHICH WILL SUPPORT THE EMBANKMENT TO A DEPTH OF AT LEAST 12"
2 - FOLLOWING THE INITIAL SITE GRADING AND THE CONSTRUCTION OF THE CUTOFF TRENCH, THE SOILS SHALL BE SCARIFIED TO A DEPTH OF AT LEAST 6" AND COMPACTED TO A MINIMUM OF 90% OF THE MAXIMUM DRY DENSITY PER ASTM D 698.
3 - FILL SOILS SHALL BE PLACED IN A MAXIMUM OF 8" LIFTS AND COMPACTED ON A HORIZONTAL PLANE AND COMPACTED TO A MINIMUM OF 96% OF MAXIMUM DENSITY PER ASTM D 698. MOISTURE SHALL BE MAINTAINED WITHIN 2% OF OPTIMUM MOISTURE PER ASTM D 698.
4 - WHERE SOILS ARE PLACED ON SLOPES, THE SLOPES SHOULD BE BENCHED. THE BENCH SHOULD EXTEND LATERALLY INTO THE NATIVE SLOPE AT LEAST 4' AND SHOULD BE NO MORE THAN 2' HIGH.
5 - RIP RAP PLACE ON THE EMBANKMENT FACE SHOULD BE PLACED SUCH THAT LARGER ROCKS ARE UNIFORMLY PLACED AND SMALLER ROCKS ARE PLACED TO FILL THE VOIDS. RIP RAP DOES NOT NEED TO BE COMPACTED BUT INDIVIDUAL ROCKS SHOULD BE PLACED TO PROVIDE A DENSE INTERLOCKING SURFACE.



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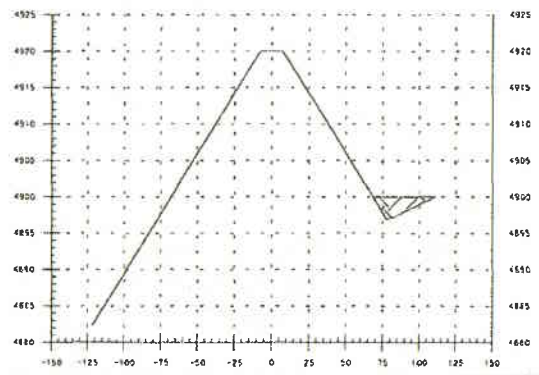
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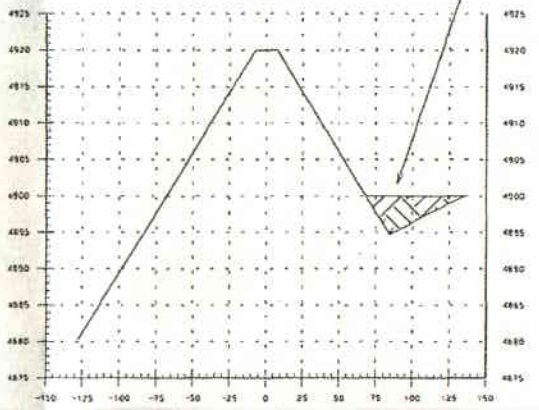

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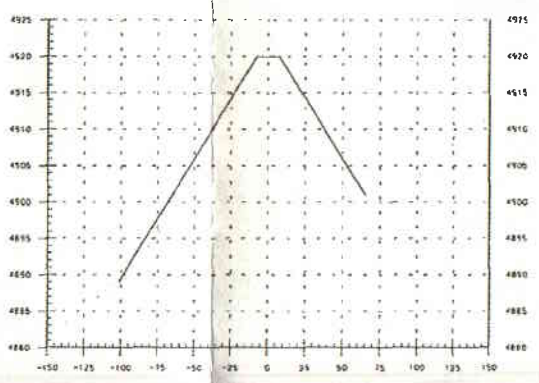
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Nampa, ID (208)467-6562

RECORD DRAWINGS

NO.	DESCRIPTION	BY	APPR.	DATE
1	UPDATES FROM FINAL GEOTECH REPORT	BRD		10-30-00
2	RECORD DRAWINGS	BRD		5-19-01
3				
4				

REVISION

ASH GROVE CEMENT COMPANY

RETENTION BASIN
PLAN VIEW & DETAILS

PLOT DATE: 5/19/2008
CAD DWG: $FILEABBREV$
PLOT SCALE:
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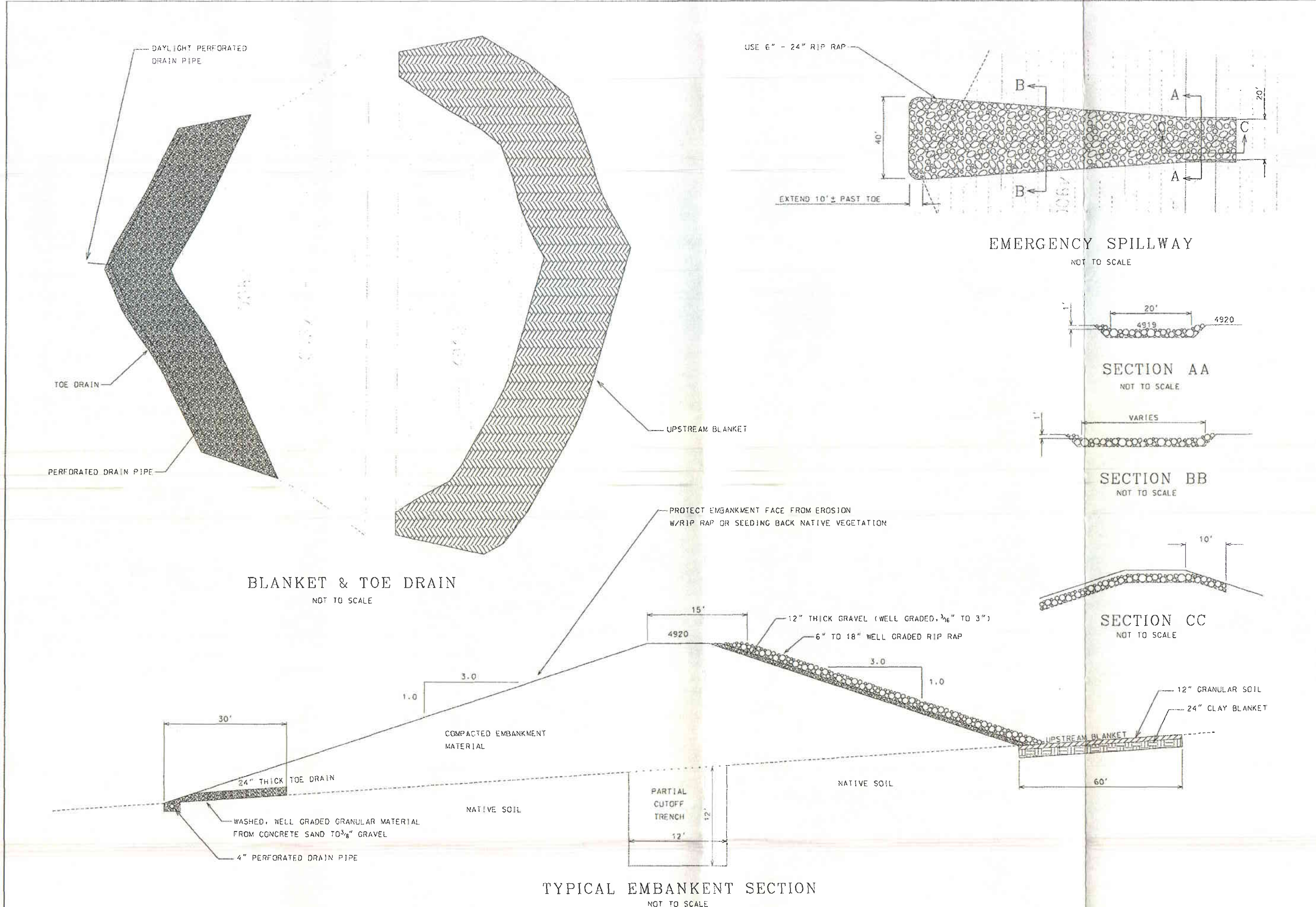
DATE: SEPT 2000
DRAWN BY: BRD
DESIGN BY: BRD
CHECKED BY:
HOR SCALE: 1" = 30'
VER SCALE: N/A
SHEET 2 OF 3



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Pocatello, ID (208)232-1313	Couer d' Alene, ID (208)667-1574	Nampa, ID (208)467-5252

RECORD DRAWINGS

REUSE OF DRAWINGS

REVISION

NO.	DESCRIPTION	BY	APR.	DATE
2	UPDATES FROM FINAL GEOTECH REPORT	BRD		10-20-00
1	RECORD DRAWINGS	BRD		3-15-01

ASH GROVE CEMENT COMPANY

RETENTION BASIN DETAILS

PLOT DATE:	5/19/2008
CAD DWG:	@FILEABBREV$
PLOT SCALE:	0 — 1 INCH
DATE:	SEPT 2000
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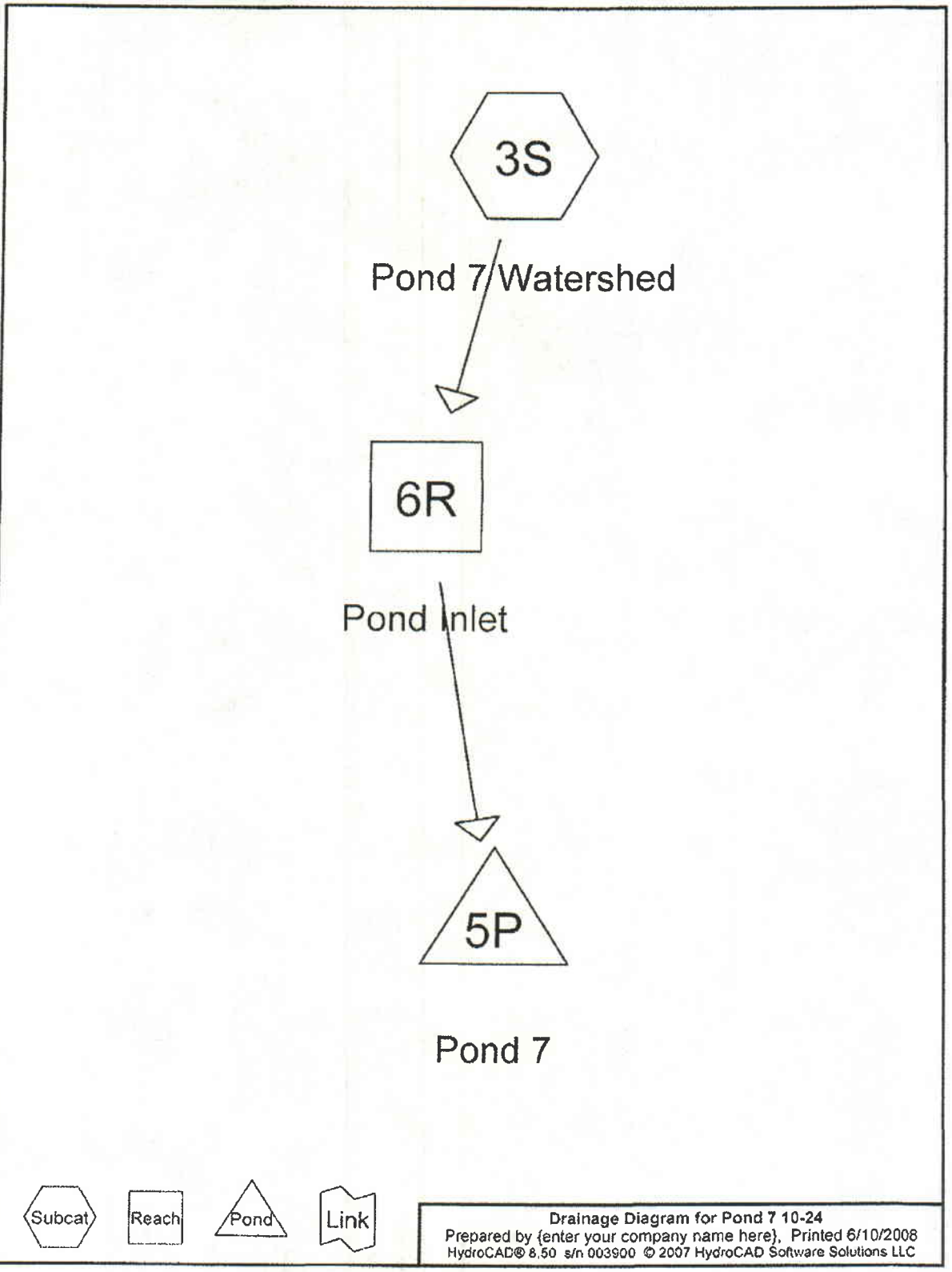
DESIGN BY:	BRD
CHECKED BY:	
HOR SCALE:	1" = 30'
VER SCALE:	N/A

SHEET 3 OF 3


3S
Pond 7 Watershed
6R
Pond Inlet
5P
Pond 7
Subcat
Reach
Pond
Link
Drainage Diagram for Pond 7 10-24
Prepared by {enter your company name here}, Printed 6/10/2008
HydroCAD® 8.50 s/n 003900 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
18,083,139	78	(3S)
18,083,139		**TOTAL AREA**

Time span=1.00-48.00 hrs, dt=0.01 hrs, 4701 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment3S: Pond 7 Watershed Runoff Area=18,083,139 sf 0.00% Impervious Runoff Depth=0.37"
Flow Length=7,761' Slope=0.3700 '/' Tc=28.6 min CN=78 Runoff=108.50 cfs 551,939 cf

Reach 6R: Pond Inlet Avg. Depth=0.95' Max Vel=9.56 fps Inflow=108.50 cfs 551,939 cf
n=0.046 L=210.0' S=0.1190 '/' Capacity=404.87 cfs Outflow=108.43 cfs 551,939 cf

Pond 5P: Pond 7 Peak Elev=4,920.30' Storage=551,938 cf Inflow=108.43 cfs 551,939 cf
Outflow=0.00 cfs 0 cf

Total Runoff Area = 18,083,139 sf Runoff Volume = 551,939 cf Average Runoff Depth = 0.37"
100.00% Pervious = 18,083,139 sf 0.00% Impervious = 0 sf

Summary for Subcatchment 3S: Pond 7 Watershed

Runoff = 108.50 cfs @ 12.27 hrs, Volume= 551,939 cf, Depth= 0.37"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr Rainfall=1.78"

	Area (sf)	CN	Description
*	18,083,139	78	
	18,083,139		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	7,761	0.3700	4.52		**Lag/CN Method,**

Summary for Reach 6R: Pond Inlet

Inflow Area = 18,083,139 sf, 0.00% Impervious, Inflow Depth = 0.37"
Inflow = 108.50 cfs @ 12.27 hrs, Volume= 551,939 cf
Outflow = 108.43 cfs @ 12.28 hrs, Volume= 551,939 cf, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.56 fps, Min. Travel Time= 0.4 min → Non-erosive if armored w/ D_{50} = 9" rip rap (see HEC No.11 graph attached)
Avg. Velocity = 3.60 fps, Avg. Travel Time= 1.0 min

Peak Storage= 2,381 cf @ 12.28 hrs, Average Depth at Peak Storage= 0.95'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 404.87 cfs

10.00' x 2.00' deep channel, n= 0.046 → $n = 0.0458\,(D_{50} \times S)^{0.159}$ where D_{50} = avg. rip rap size (in), S = channel slope (ft/ft) (Abt et al, 1987)
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 210.0' Slope= 0.1190 '/'
Inlet Invert= 4,946.39', Outlet Invert= 4,921.40'

D_{50} = 9"
S = 0.119 ft/ft

‡

Summary for Pond 5P: Pond 7

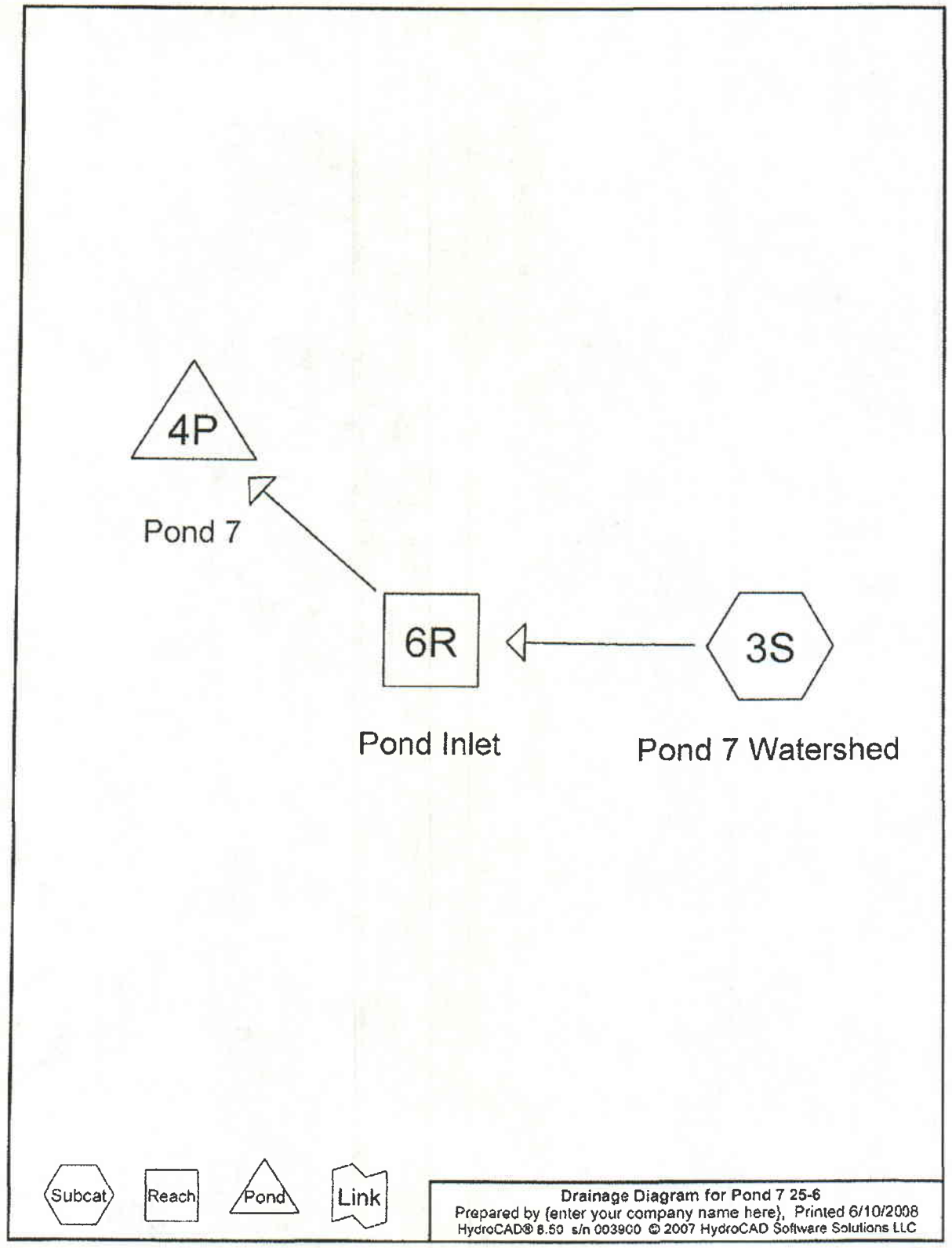
Inflow Area = 18,083,139 sf, 0.00% Impervious, Inflow Depth = 0.37"
Inflow = 108.43 cfs @ 12.28 hrs, Volume= 551,939 cf
Outflow = 0.00 cfs @ 1.00 hrs, Volume= 0 cf, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 4,920.30' @ 26.77 hrs Surf.Area= 61,477 sf Storage= 551,938 cf

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	4,900.00'	620,060 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,900.00	2,000	0	0
4,905.00	8,653	26,633	26,633
4,910.00	24,650	83,258	109,890
4,915.00	41,774	166,060	275,950
4,920.00	61,336	257,775	533,725
4,921.40	62,000	86,335	620,060



Drainage Diagram for Pond 7 25-6
Prepared by {enter your company name here}, Printed 6/10/2008
HydroCAD® 8.50 s/n 003900 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
18,083,139	78	(3S)

Summary for Subcatchment 3S: Pond 7 Watershed

Runoff = 73.32 cfs @ 3.40 hrs, Volume= 300,270 cf, Depth= 0.20"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Type II 24-hr 6.00 hrs Rainfall=1.42"

	Area (sf)	CN	Description
*	18,083,139	78	
	18,083,139		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.6	7,761	0.3700	4.52		**Lag/CN Method,**

Summary for Reach 6R: Pond Inlet

Inflow Area = 18,083,139 sf, 0.00% Impervious, Inflow Depth = 0.20"
Inflow = 73.32 cfs @ 3.40 hrs, Volume= 300,270 cf
Outflow = 73.23 cfs @ 3.42 hrs, Volume= 300,270 cf, Atten= 0%, Lag= 0.8 min

Routing by Stor-Ind+Trans method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity=8.38 fps Min. Travel Time= 0.4 min → This is less than max vel. from 10 yr - 24 hr event. Thus, the 10yr -24 hr event conditions dictate rip rap specs
Avg. Velocity = 4.08 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,835 cf @ 3.41 hrs, Average Depth at Peak Storage= 0.76'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 404.87 cfs

10.00' x 2.00' deep channel n= 0.046 $n = 0.0456 (D_{50} \times S)^{0.159}$ (Abt, et al, 1987)
Side Slope Z-value= 2.0 '/' Top Width= 18.00'
Length= 210.0' Slope= 0.1190 '/' $D_{50} = 9"$
Inlet Invert= 4,946.39', Outlet Invert= 4,921.40' $S = 0.119$ ft/ft

‡

Summary for Pond 4P: Pond 7

Inflow Area = 18,083,139 sf, 0.00% Impervious, Inflow Depth = 0.20"
Inflow = 73.23 cfs @ 3.42 hrs, Volume= 300,270 cf
Outflow = 56.20 cfs @ 3.61 hrs, Volume= 300,270 cf, Atten= 23%, Lag= 11.6 min
Primary = 56.20 cfs @ 3.61 hrs, Volume= 300,270 cf

Routing by Stor-Ind method, Time Span= 1.00-48.00 hrs, dt= 0.01 hrs
Starting Elev= 4,920.40' Surf.Area= 61,526 sf Storage= 558,297 cf
Peak Elev= 4,921.19' @ 3.61 hrs Surf.Area= 61,902 sf Storage= 607,322 cf (49,025 cf above start)

Plug-Flow detention time= (not calculated: initial storage excedes outflow)
Center-of-Mass det. time= 19.0 min (273.1 - 254.2)

Volume	Invert	Avail.Storage	Storage Description
#1	4,900.00'	620,060 cf	**Custom Stage Data (Prismatic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
4,900.00	2,000	0	0
4,905.00	8,653	26,633	26,633
4,910.00	24,650	83,258	109,890
4,915.00	41,774	166,060	275,950
4,920.00	61,336	257,775	533,725
4,921.40	62,000	86,335	620,060

Device	Routing	Invert	Outlet Devices
#1	Primary	4,920.40'	**30.0' long x 15.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=56.11 cfs @ 3.61 hrs HW=4,921.19' (Free Discharge)
↑**1=Broad-Crested Rectangular Weir** (Weir Controls 56.11 cfs @ 2.35 fps)

< 5 fps. Nonerosive flow. No armor req'd on spillway

4.3.1 Estimating Manning's n for Cascading Flow

The average Manning's roughness value, n, was computed for each failure test based on flow velocities and depths measured prior to failure, and are plotted versus the median stone size, D_{50}, in Fig. 4.7. It is observed in Fig. 4.7 that the n values for 1% and 2% slopes fall closely to the solid line representing a relationship developed by Anderson et al. (see Section 4.3.2). However, the n value for each stone size increased as the slope of the embankment increased, and the n value is over 40% higher when $Depth/D_{50} < 2$ (cascading flow conditions) than when $Depth/D_{50}$ is greater than 2 (Table 4.8).

A median stone size-slope parameter ($D_{50} \times S$) was correlated to the Manning's n value for the CSU data as presented in Fig. 4.8. Combining the median stone size and slope in one parameter appears to have reduced the data scatter. The relationship can be expressed as:

$$n = 0.0456 \, (D_{50} \times S)^{0.159} \qquad (4.8)$$

where D_{50} is in inches. The correlation coefficient, r^2, is 0.90. Therefore, a Manning's n value can be estimated for a riprapped surface in cascading flow as a function of the median stone size and slope.

4.3.2 Comparison of Procedures

A commonly used expression for determining Manning's n for riprap was presented by Anderson et al. (1970) as

NUREG/CR-4651 ORNL/TM-10100
Reference: Development of Riprap Design Criteria by Riprap Testing in Flumes: Phase 1
SR Abt et al CSU, Oak Ridge Nat'l Lab USNRC, 1987

Reference: Use of Riprap for Bank Protection
Hydraulic Engineering Circular No. 11
USDOT Federal Highway Admin 1978

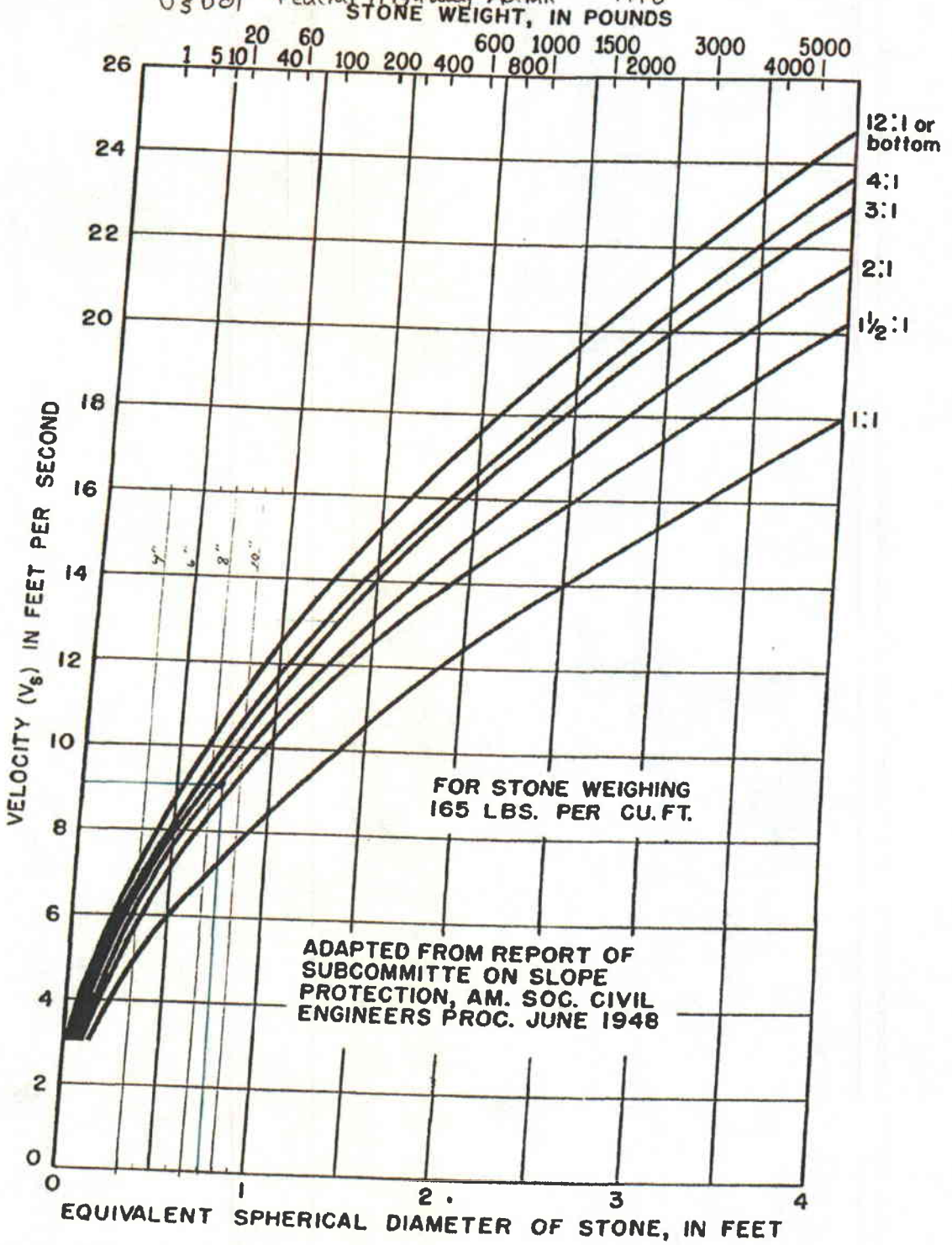
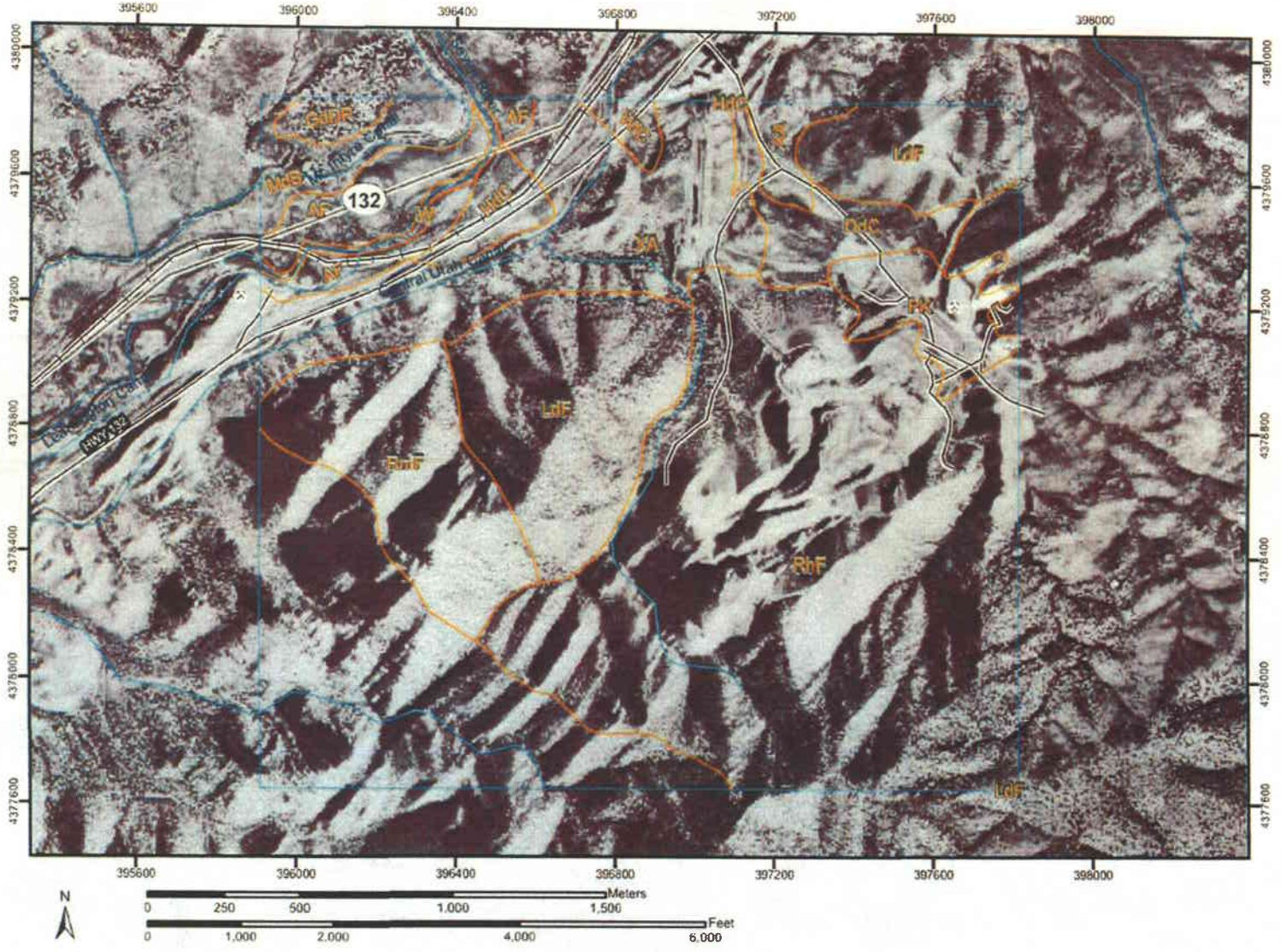


FIG. 2 - SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

Soil Map–Fairfield-Nephi Area, Utah; and Fishlake National Forest - Tushar-Pavant Division - Parts of Sevier, Millard, Beaver and Piute Counties, Utah



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fairfield-Nephi Area, Utah
Survey Area Data: Version 3, Jan 4, 2007

Soil Survey Area: Fishlake National Forest - Tushar-Pavant Division - Parts of Sevier, Millard, Beaver and Piute Counties, Utah
Survey Area Data: Not available

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

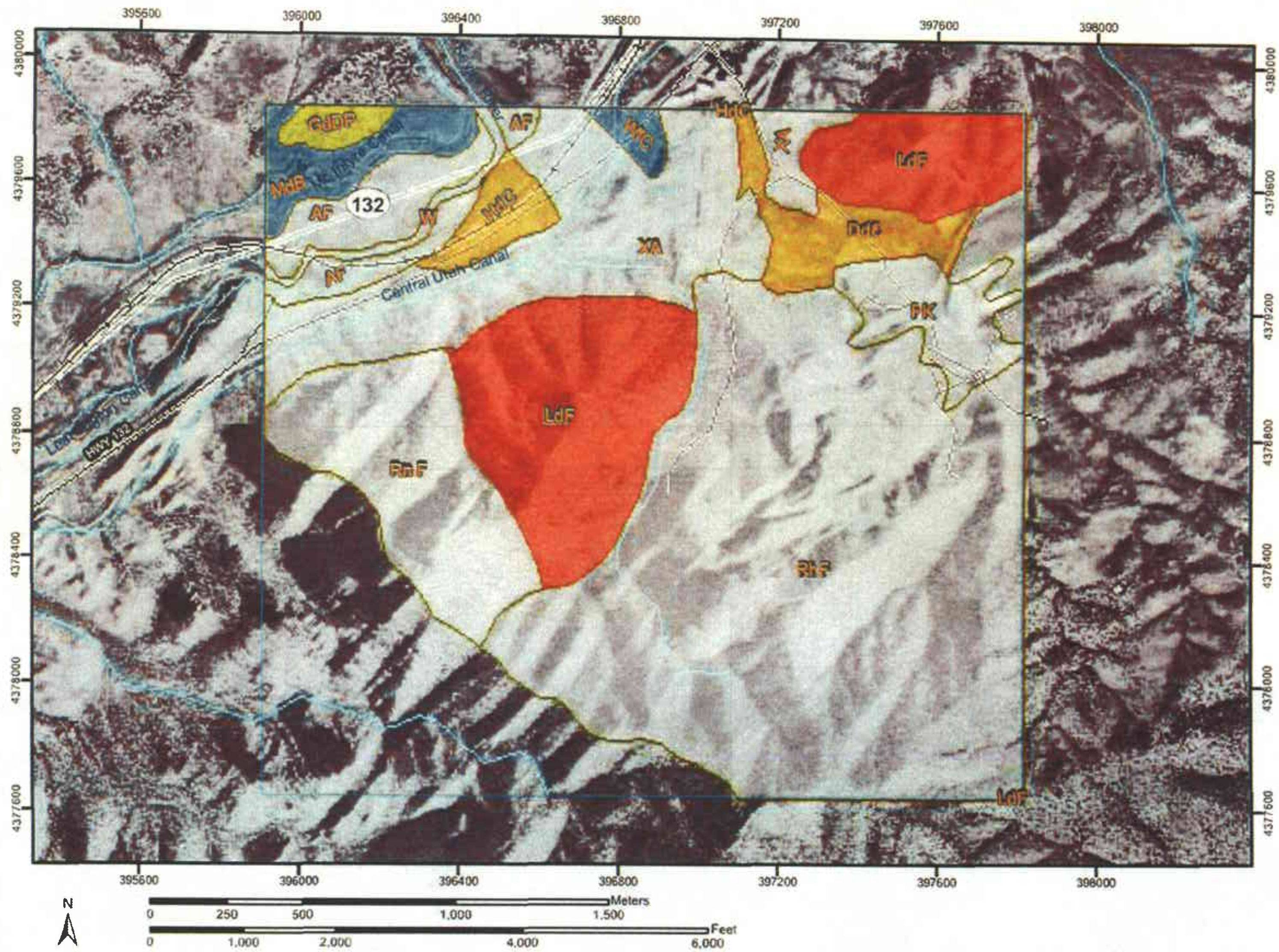
Date(s) aerial images were photographed: 8/17/1993; 8/23/1993

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Fairfield-Nephi Area, Utah (UT608)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AF	Aquic Ustifluvents, saline	52.8	3.9%
DdC	Donnardo stony loam, 2 to 8 percent slopes	38.2	2.8%
GdDP	Goldrun loamy fine sand, hummocky, 0 to 10 percent slopes	10.4	0.8%
HdC	Hiko Peak stony sandy loam, 4 to 8 percent slopes	18.7	1.4%
LdF	Lodar-Rock outcrop complex, 30 to 70 percent slopes	174.1	12.8%
MdB	Manassa-Mellor silt loam, 0 to 2 percent slopes	30.4	2.2%
PK	Pits-Dumps complex	39.5	2.9%
RhF	Rock outcrop-Lodar complex, 30 to 70 percent slopes	515.4	38.0%
RmF	Rock outcrop-Saxby complex, 30 to 70 percent slopes	104.6	7.7%
W	Water	8.4	0.6%
WfC	Woodrow silt loam, 2 to 5 percent slopes	8.3	0.6%
XA	Xerertic Torriorthents, steep	163.7	12.1%
Fishlake National Forest - Tushar-Pavant Division - Parts of Sevier, Millard, Beaver and Piute Counties, Utah (UT649)			
No soil data available for this soil survey area.			
Totals for Area of Interest (AOI)		1,358.2	100.0%

K Factor, Whole Soil–Fairfield-Nephi Area, Utah; and Fishlake National Forest - Tushar-Pavant Division - Parts of Sevier, Millard, Beaver and Piute Counties, Utah



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Soil Ratings
- .02
- .05
- .10
- .15
- .17
- .20
- .24
- .28
- .32
- .37
- .43
- .49
- .55
- .64
- Not rated or not available

Water Features
- Oceans
- Streams and Canals

Transportation
- Rails

Roads
- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

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Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 12N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fairfield-Nephi Area, Utah
Survey Area Data: Version 3, Jan 4, 2007

Soil Survey Area: Fishlake National Forest - Tushar-Pavant Division - Parts of Sevier, Millard, Beaver and Piute Counties, Utah
Survey Area Data: Not available

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Date(s) aerial images were photographed: 8/17/1993; 8/23/1993

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

K Factor, Whole Soil

K Factor, Whole Soil— Summary by Map Unit — Fairfield-Nephi Area, Utah				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AF	Aquic Ustifluvents, saline		52.8	3.9%
DdC	Donnardo stony loam, 2 to 8 percent slopes	.15	38.2	2.8%
GdDP	Goldrun loamy fine sand, hummocky, 0 to 10 percent slopes	.17	10.4	0.8%
HdC	Hiko Peak stony sandy loam, 4 to 8 percent slopes	.15	18.7	1.4%
LdF	Lodar-Rock outcrop complex, 30 to 70 percent slopes	.05	174.1	12.8%
MdB	Manassa-Melior silt loam, 0 to 2 percent slopes	.43	30.4	2.2%
PK	Pits-Dumps complex		39.5	2.9%
RhF	Rock outcrop-Lodar complex, 30 to 70 percent slopes		515.4	38.0%
RmF	Rock outcrop-Saxby complex, 30 to 70 percent slopes		104.6	7.7%
W	Water		8.4	0.6%
WfC	Woodrow silt loam, 2 to 5 percent slopes	.43	8.3	0.6%
XA	Xerertic Torriorthents, steep		163.7	12.1%
Totals for Area of Interest (AOI)			1,358.2	100.0%

Description

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and saturated hydraulic conductivity (Ksat). Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

"Erosion factor Kw (whole soil)" indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

Layer Options: Surface Layer

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Utah 39.55658 N 112.18827 W 5534 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G M Bonnin, D Martin, B Lin, T Parzybok, M Yekta, and D Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006
Extracted Mon May 19 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.12	0.18	0.22	0.30	0.37	0.46	0.51	0.66	0.83	1.03	1.16	1.36	1.60	1.81	2.41	2.89	3.62	4.30
2	0.15	0.23	0.29	0.39	0.48	0.58	0.65	0.82	1.02	1.28	1.43	1.68	1.99	2.25	2.98	3.59	4.48	5.34
5	0.21	0.32	0.40	0.53	0.66	0.77	0.83	1.02	1.25	1.55	1.75	2.07	2.44	2.76	3.62	4.35	5.40	6.43
10	0.26	0.40	0.49	0.67	0.82	0.94	1.00	1.18	1.43	1.78	2.01	2.41	2.83	3.16	4.11	4.95	6.11	7.26
25	0.34	0.52	0.64	0.87	1.07	1.21	1.26	1.42	1.68	2.09	2.39	2.87	3.35	3.71	4.75	5.74	7.03	8.31
50	0.41	0.63	0.78	1.05	1.29	1.45	1.47	1.62	1.88	2.33	2.68	3.25	3.75	4.14	5.22	6.33	7.71	9.07
100	0.49	0.75	0.93	1.25	1.55	1.71	1.74	1.86	2.08	2.58	2.98	3.64	4.18	4.58	5.70	6.92	8.39	9.83
200	0.58	0.89	1.10	1.48	1.84	2.03	2.05	2.14	2.33	2.82	3.30	4.06	4.62	5.02	6.16	7.50	9.05	10.55
500	0.73	1.11	1.38	1.85	2.29	2.51	2.54	2.63	2.80	3.16	3.74	4.65	5.21	5.61	6.76	8.26	9.92	11.49
1000	0.86	1.31	1.62	2.18	2.70	2.95	2.97	3.06	3.21	3.41	4.08	5.12	5.68	6.06	7.21	8.83	10.57	12.18

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.14	0.21	0.26	0.35	0.43	0.52	0.58	0.72	0.90	1.12	1.25	1.48	1.74	1.97	2.60	3.13	3.91	4.66
2	0.17	0.27	0.33	0.44	0.55	0.66	0.73	0.90	1.11	1.39	1.55	1.83	2.16	2.45	3.23	3.89	4.85	5.79
5	0.24	0.37	0.46	0.62	0.76	0.88	0.94	1.12	1.36	1.69	1.90	2.25	2.66	3.00	3.92	4.73	5.85	6.98
10	0.30	0.46	0.57	0.77	0.96	1.07	1.13	1.30	1.56	1.93	2.19	2.62	3.07	3.44	4.45	5.38	6.63	7.88
25	0.40	0.60	0.75	1.01	1.25	1.38	1.42	1.57	1.84	2.27	2.59	3.12	3.64	4.04	5.14	6.25	7.64	9.03
50	0.48	0.73	0.91	1.22	1.51	1.66	1.67	1.80	2.07	2.53	2.92	3.54	4.08	4.51	5.67	6.90	8.39	9.87
100	0.58	0.88	1.09	1.47	1.82	1.98	1.99	2.08	2.31	2.80	3.25	3.98	4.56	4.99	6.20	7.56	9.16	10.70
200	0.69	1.05	1.31	1.76	2.18	2.36	2.39	2.42	2.61	3.08	3.62	4.46	5.05	5.49	6.72	8.22	9.91	11.53
500	0.88	1.34	1.66	2.24	2.77	2.98	3.01	3.03	3.17	3.46	4.12	5.13	5.73	6.18	7.42	9.09	10.91	12.60
1000	1.05	1.60	1.99	2.67	3.31	3.56	3.60	3.63	3.68	3.75	4.52	5.68	6.28	6.72	7.95	9.76	11.68	13.40

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.

Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.10	0.16	0.19	0.26	0.32	0.41	0.47	0.60	0.77	0.95	1.07	1.26	1.48	1.67	2.23	2.67	3.34	3.97
2	0.13	0.20	0.25	0.34	0.42	0.52	0.58	0.75	0.94	1.18	1.32	1.55	1.83	2.08	2.76	3.31	4.13	4.92
5	0.18	0.28	0.34	0.47	0.57	0.68	0.75	0.93	1.15	1.44	1.61	1.91	2.25	2.54	3.35	4.00	4.97	5.92
10	0.23	0.34	0.42	0.57	0.71	0.83	0.90	1.08	1.31	1.64	1.85	2.21	2.60	2.91	3.79	4.55	5.61	6.66
25	0.29	0.44	0.54	0.73	0.90	1.04	1.11	1.28	1.53	1.92	2.19	2.62	3.06	3.40	4.37	5.25	6.43	7.60
50	0.34	0.52	0.64	0.86	1.07	1.22	1.28	1.44	1.70	2.13	2.44	2.95	3.42	3.77	4.79	5.77	7.02	8.27
100	0.40	0.61	0.75	1.01	1.25	1.42	1.48	1.62	1.86	2.34	2.70	3.28	3.79	4.14	5.19	6.28	7.61	8.92

200	0.46	0.70	0.87	1.17	1.45	1.62	1.70	1.84	2.05	2.55	2.97	3.62	4.15	4.51	5.59	6.77	8.17	9.54
500	0.55	0.83	1.04	1.40	1.73	1.93	2.03	2.20	2.42	2.83	3.32	4.08	4.63	4.99	6.09	7.39	8.87	10.30
1000	0.62	0.95	1.18	1.59	1.97	2.19	2.31	2.50	2.73	3.03	3.59	4.45	4.99	5.35	6.44	7.84	9.37	10.84

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.
** These precipitation frequency estimates are based on a partial duration maxima series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Text version of tables